SIEMENS

MAMMOMAT 1000/3000 Nova - Opdima®

SP

Service

Service Instructions

ASW V3.1

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General

Valid for Opdima® system ASW 3.1 on SUN workstation, part No. 66 33 718.

This document is valid for a Sun Blade 150 (SUN workstation with serial No.≥1600).

Training of customer support engineers

Due to the technology used in this equipment, setup, service and maintenance may only be carried out by a customer support engineer who has attended a training workshop or has participated in at least one installation.

Documents required

- Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®
  (included in the Opdima® delivery)
- MAMMOMAT 1000/3000 Nova - Opdima® Maintenance Instructions
  (included in the Opdima® delivery)
- MAMMOMAT 3000 - Opdima® Wiring Diagram
  (included in the Opdima® delivery)
- MAMMOMAT 3000 - Opdima® Installation and Start-Up Instructions
  (included in the Opdima® delivery)
- MAMMOMAT 1000/3000 Nova Wiring Diagram

CD-ROMs required

- Sun Blade 150 Hardware Documentation (included in the Opdima® delivery)
  Files included on the CD-ROM;
  Sun Blade 150 Getting Started Guide,
  Sun Blade 150 Service Manual with Sun Blade 150 ShowMe How Animations and Setting Up the Sun Blade 150 System.
- OPDIMA® Solaris 8 Installation CD v1.0, part No. 66 33 049
  (included in the Opdima® delivery)
- OPDIMA® Installation CD, version 3.1, part No. 66 33 700
  (included in the Opdima® delivery)

Meters and appliances required

- Protective ground wire tester (44 15 899 RV090)
- Stereo calibration phantom (included in the Opdima® delivery) (part No. 64 30 701)
- AEC calibration plexiglass, four plates measuring 150 mm x 150 mm x 19 mm and one plate measuring 150 mm x 150 mm x 9,7 mm, part No. 65 61 232 and 65 61 224 respectively
- (On the territory of the US generally calibration phantom of 4.5 cm PMMA is known, it can be used wherever possible instead of the above plexiglas.)
- Resolution phantom with at least 10 line pairs per mm. Recommended is the bar pattern phantom (part no. 07-555, or part no. 18-216) from Nuclear Associates, URL http:// www.nucl.com
- PC with a CD drive running Windows 95 or later by using Netscape Navigator™, version 5.0 or later, or Internet Explorer, version 5.0 or later or Acrobat©Reader™ 5.0 or later (to be able to read Sun Blade 150 Service manuals).

Tools required

- Standard service tools
- PROM extractor for PLCC 32

Block diagram

The block diagram below shows the function of the Opdima® system.

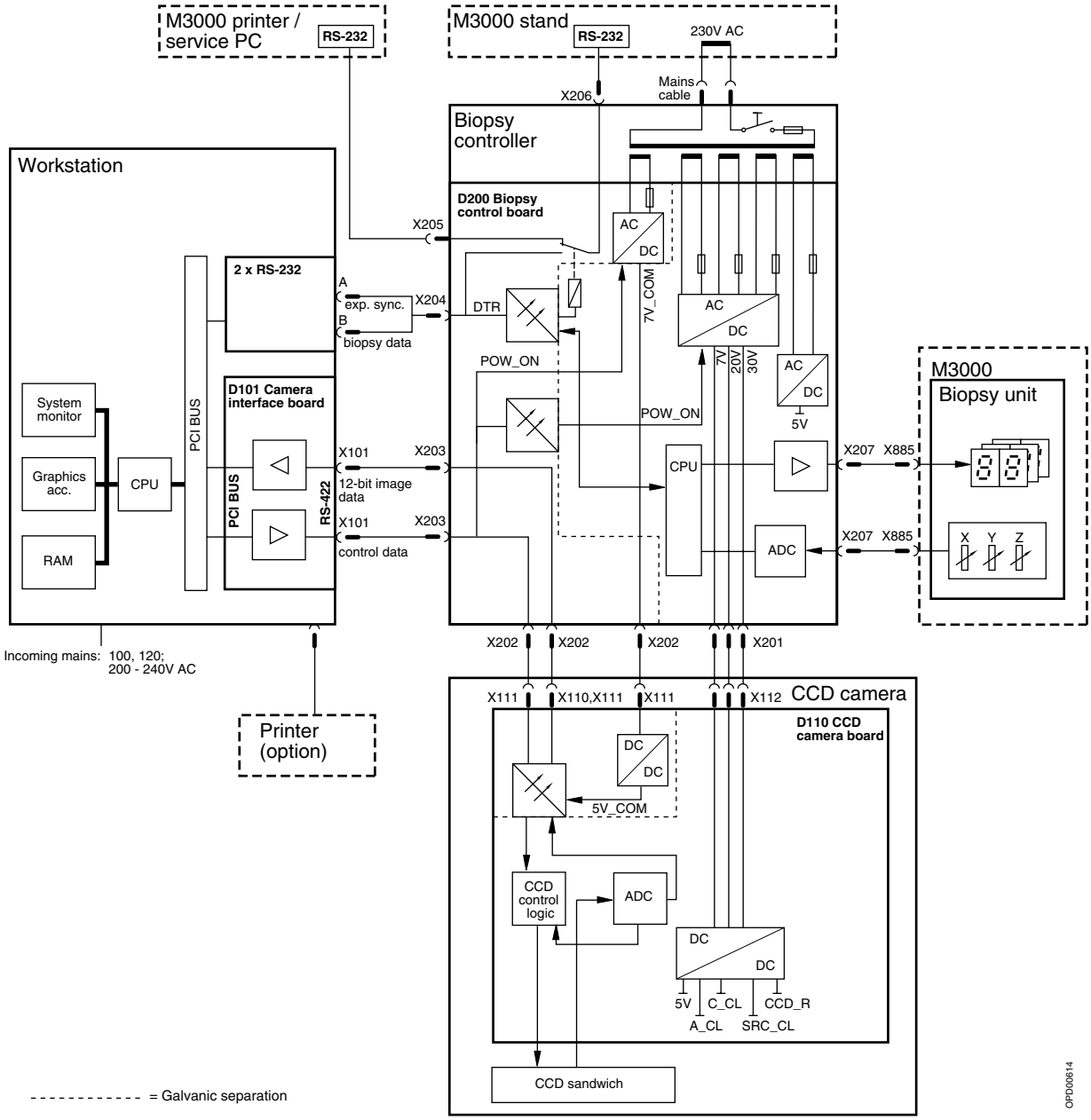

Fig. 1 Block diagram

Biopsy controller

The biopsy controller has three main functions:

- Biopsy unit control
- Switching of RS-232 from MAMMOMAT to either MAMMOMAT printer/service PC or workstation
- CCD camera power supply

Biopsy unit control

The biopsy functions are controlled by the micro controller. In the biopsy unit there are three potentiometers indicating the current needle position.

The values from the potentiometers are A/D converted and sent to the micro controller. To check the converted values from the A/D converter, the potentiometer values are converted in parallel by the micro controller.

RS-232 switching

To enable RS-232 communication between MAMMOMAT and either MAMMOMAT printer/ service PC or workstation, a relay is used. The relay is controlled by the workstation.

CCD camera power supply

The biopsy controller converts the mains AC voltage to DC voltages. The DC voltages are used by the CCD camera.

LEDs

On the biopsy controller printed circuit board, D200, there are a number of LEDs with the following meaning:

- Indication of RAM error
- Indication of PROM error
- Indication of analog/digital converter
- Indication of NVM error
- Indication of TxD error
- Selection of RS-232 communication to MAMMOMAT printer/service PC or workstation (SELECT_WS)
- Supply voltages (e.g. 5V_COM, 30V_CC)

For more information on LEDs, see MAMMOMAT 1000/3000/3000 Nova - Opdima® Wiring Diagram.

Workstation

The workstation includes the following parts:

- Main unit, including temporary storage media i.e. hard disk
- Monitor
- Keyboard and mouse
- Internal CD drive
- External MO unit i.e. magneto-optical drive, used for the permanent storage media and backup

The workstation is used for:

- Running application software
- Communication with the CCD camera
- Control of MAMMOMAT and biopsy unit

Application software

The application software run by the workstation is the main communication interface with the user and units of the Opdima® system.

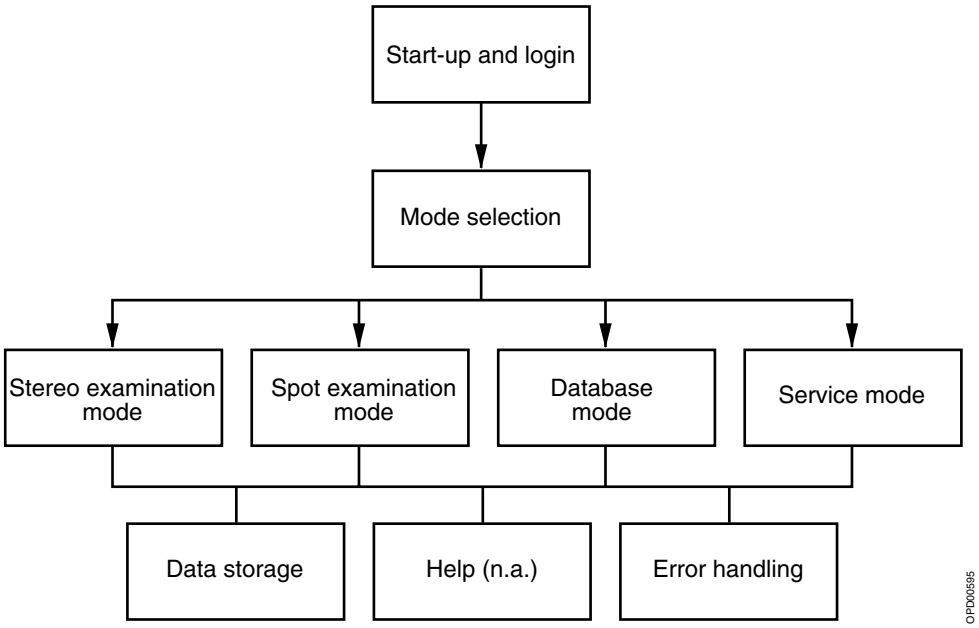

Fig. 2 Application software logic flow

CCD camera communication

The camera interface in the workstation main unit sends commands to the CCD camera from the workstation and receives the image from the camera. The interface adapts the workstation data bus to RS-422.

The camera interface also supplies the CCD camera opto couplers with power.

Control of MAMMOMAT and biopsy unit

The workstation controls the MAMMOMAT via RS-232 communication.

Biopsy calculations are performed by the workstation and target coordinates are sent to the biopsy unit.

Monitor

If the settings of the monitor has changed, set values as specified in the Monitor Installation Instruction.

CCD camera

The CCD camera consists of a printed circuit board, CCD sandwich and RS-422 interface. When the x-ray beams reach the CCD sandwich, electric energy proportional to the x-ray energy is produced. The produced electrical current is A/D converted to digital information and sent to the workstation RAM via an RS-422 interface.

Biopsy unit

The biopsy unit is used for performing biopsy examinations.

The biopsy unit consists of a needle positioning device which is firmly attached to an 18 cm x 24 cm object table with a cut-out contour that is superimposed on the CCD. External stereo diaphragm, needle support and compression plate are also included in the biopsy unit. The biopsy unit can easily be attached to the swivel arm of the MAMMOMAT.

There are three displays on the biopsy unit front. The displays show spatial deviation of needle tip from the suspect point in x-, y- and z-axis calculated by the workstation.

Three potentiometers monitors the actual position of the needle tip.

CAUTION

The CCD camera has to be handled with extreme care, it is very sensitive to mechanical shocks and temperature. When not connected do not touch the pins in the camera contacts. Shock and temperature sensors are integrated in the camera.

CAUTION

The CCD camera is sensitive to mechanical shock and shall always be stored in the attaché case, delivered with the system, when disconnected from the biopsy controller.

The camera shall be used within 10−30° C.

The camera shall be transported or stored within 0−40° C.

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It is very important that any intervention in the equipment shall start with disconnecting it from the power supply with the main circuit breaker. To prevent accidental triggering of high voltage and radiation, set the switch S2 (SS) on board D702 to OFF (lower position, no triggering of the SS relay).

CAUTION

When switching off the workstation use the power off procedure described in the Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

Switching off the workstation before the software has been closed down may cause damage to the files on the hard disc.

⚠WARNING

If the system is only switched off at the control panel or with S2/D711 in the MAMMOMAT generator, line voltage will still be present at the generator line connection, line filter Z1, Z2, transformer T1, transformer T10 and board D711 (see MAMMOMAT 1000/3000 Nova Wiring Diagram). The Opdima® is switched off separately.

⚠WARNING

After shut-down of the system, there may still be about 380 V DC present on the intermediate circuit of the MAMMOMAT generator. This will be indicated by LED V24 on board D710. The voltage will drop to less than 30 V within about 3 minutes, the LED goes out at about 30 V.

CAUTION

Observe the currently valid guidelines for handling electronics endangered by electrostatic discharge.

Use ESD-equipment, ground prior to making contact and place the components on a conductive surface.

The boards contain electrostatic highly sensitive components requiring particular care in their handling.

Risk of damaging components.

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General

There are three different user levels in the Opdima® software.

- Regular user
- Administration user
- Service user

Administration users use the Service mode to perform the following tasks:

- Calibration of the biopsy unit
- Setting up needles
- User administration
- Network setup, DICOM nodes
- Backup functions

Advanced service

Service users can additionally access advanced service functions. To get access you have to log in with the user name “service”. The password is obtained from Siemens Head Quarter Support Center.

The following advanced service functions are included:

- Country settings
- Unit tests
- Software upgrade
- Restore disk
- Camera calibration/maintenance
- Disk cache
- Printer setup
- Log administration
- View log

NOTICE	**The Opdima® external diaphragm must be used for tests and calibrations involving radiation.**

Selection of mode

After a successful login, the mode selection dialog is displayed.

1. Press the Service button.

   Press Logout to cancel.

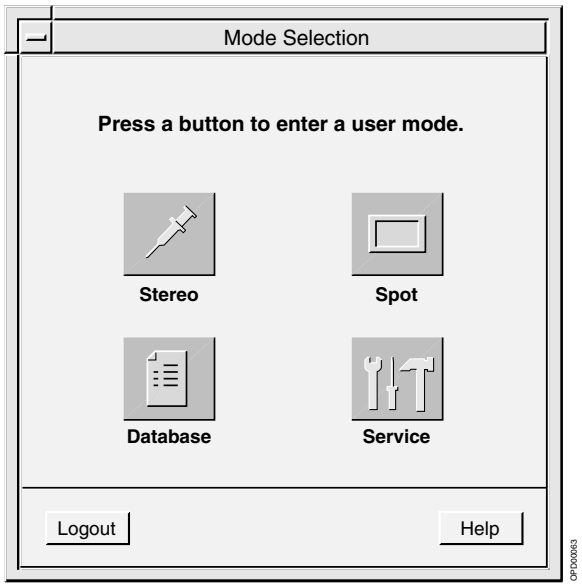

Fig. 1 Mode selection dialog

2. Select desired service function from the service dialog.

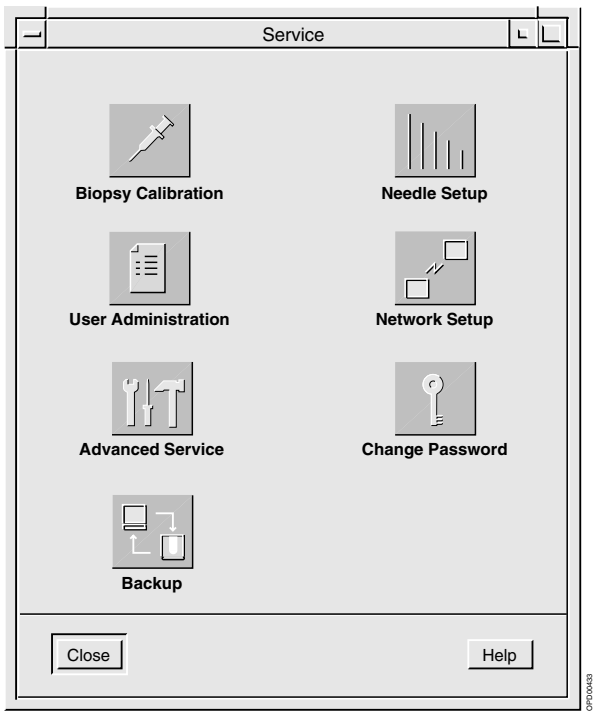

Fig. 2 Service dialog

Calibration of the biopsy unit

Calibration of the biopsy unit is carried out by using a stereo calibration phantom with targets at fixed positions. By releasing two stereo pair exposures with a fine needle adjusted to different targets, the system is automatically calibrated. Follow the instructions given on the screen during the calibration procedure.

1. Press the Biopsy Calibration button in the service dialog.
   The following is shown on the screen:

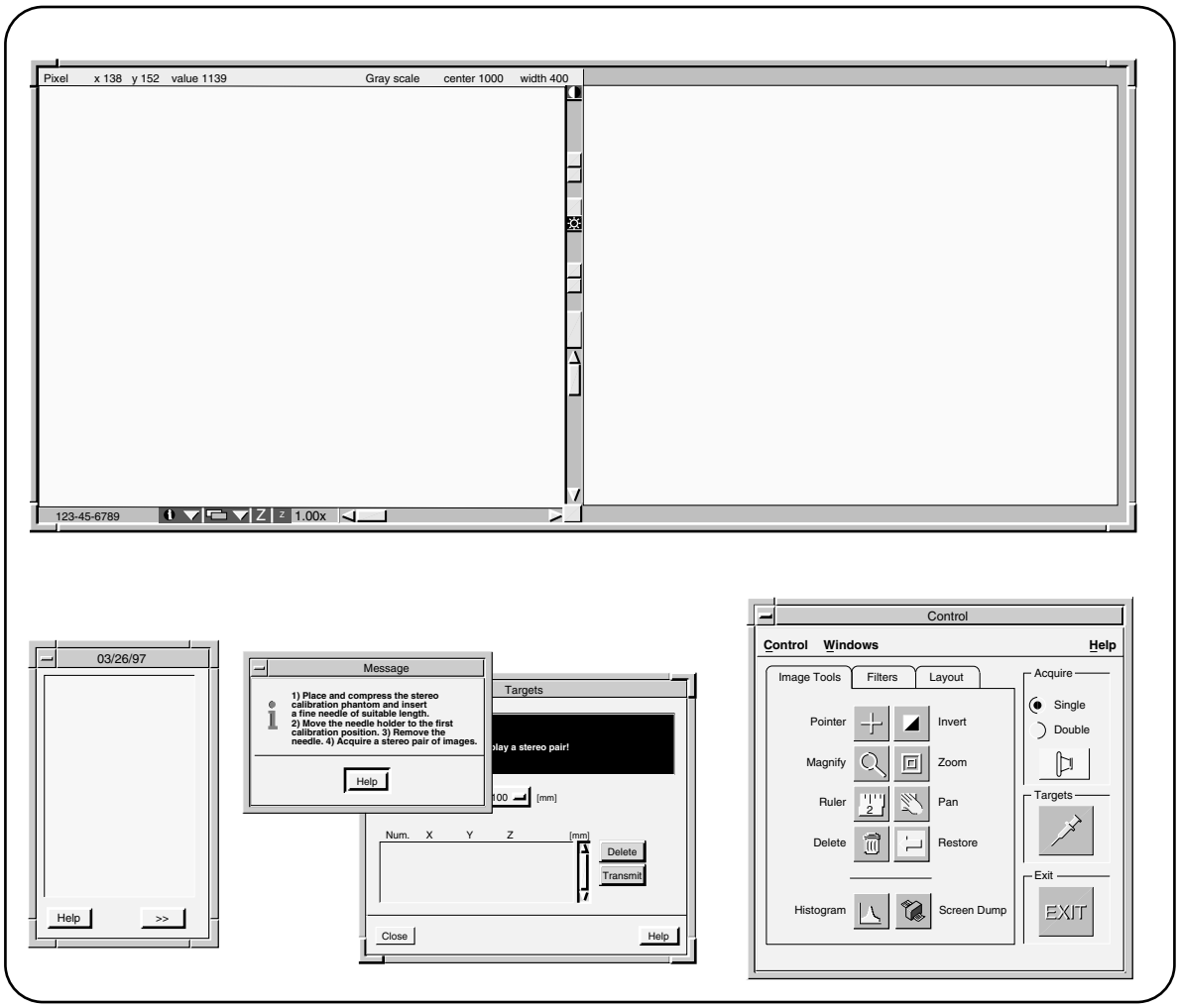

Fig. 3 Dialogs during calibration

2. Place the stereo calibration phantom on the biopsy table and compress.

   With the targets facing the patient side, the phantom fits in the opening of the stereo compression plate, see Fig. 4. Target 2 shall be positioned 25−28 mm in negative x-axis direction and 12 mm from the object table side.

3. Select a fine needle to be used and measure the length.

   Measuring the needle length is described on Page 5 - 7.

NOTICE	**We recommend to use a needle that measures 90 mm, this will make it possible to avoid having to change needle while calibrating.**

4. Choose Other in the Needle option menu and enter the selected needle length (minimum 90 mm).
5. Insert needle guides corresponding with the needle diameter.
6. Insert the fine needle into the needle guides.
7. Move the needle to Target 1 of the stereo calibration phantom, see Fig. 4, by using the adjustment knobs. Position the needle according to Fig. 5.

NOTICE	**Make sure the needle is moved to Target 1.**

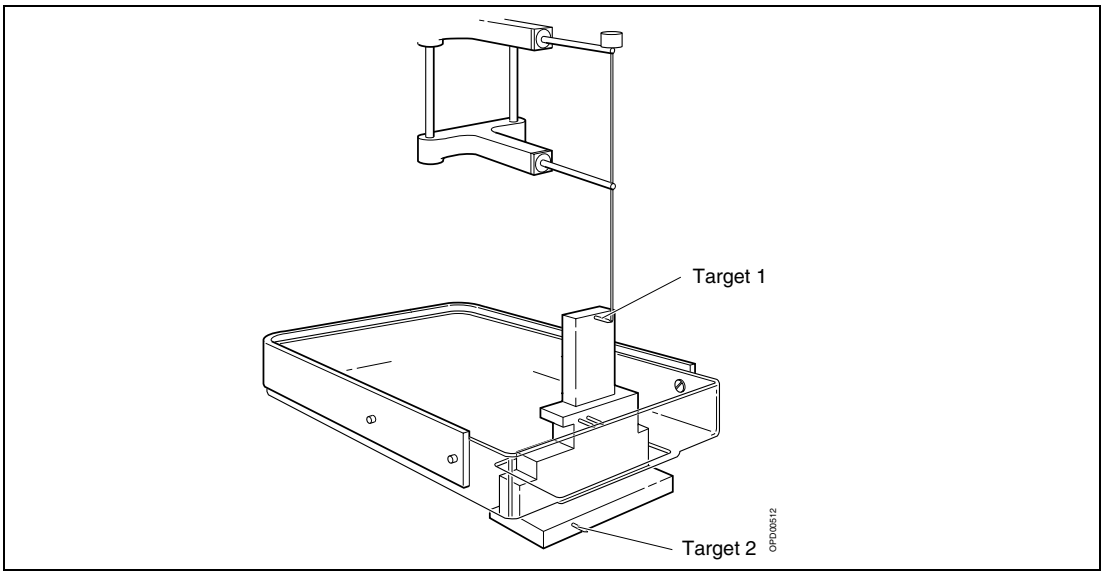

Fig. 4 Stereo calibration phantom

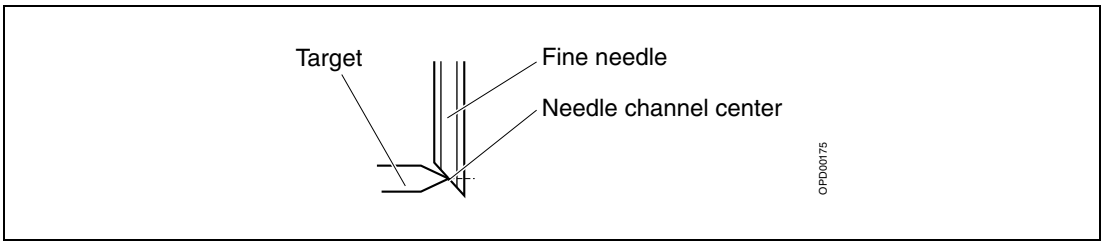

Fig. 5 Position of needle

8. Remove the needle.
9. Acquire and release a stereo pair of images.
   Set the exposure parameters to 25 kV and 28 mAs in manual mode.

10. Check the reference marks and adjust if necessary, mark Target 1 and press Transmit.

NOTICE

When performing the biopsy calibration set the magnification to 0.7 and change Contrast/brightness in order to find all targets in the phantom. Be sure to mark the target at which the needle tip was positioned.

11. Insert the fine needle into the needle support of the biopsy unit.
12. Move the needle to Target 2 of the stereo calibration phantom by using the adjustment knobs.
13. Remove the needle.
14. Acquire and release a stereo pair of images.
    Set the exposure parameters to 25 kV and 28 mAs in manual mode.
15. Check the reference marks and adjust if necessary, mark Target 2 and press Transmit.

    When the calibration is successfully calibrated, the following message is displayed:

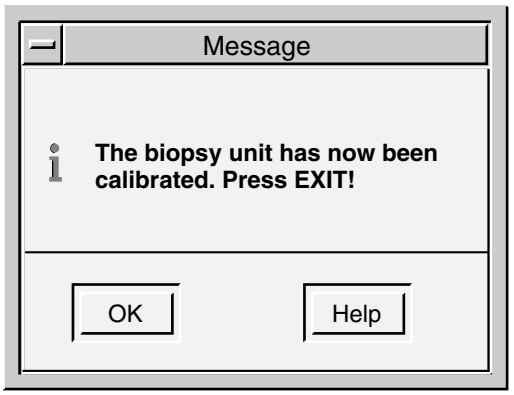

Fig. 6 Information message

16. Perform a final check according to Verifying the calibration of the biopsy unit on Page 10 - 1 to make sure that the biopsy unit works properly.

Setting up needles

1. Press the Needle Setup button in the service dialog.

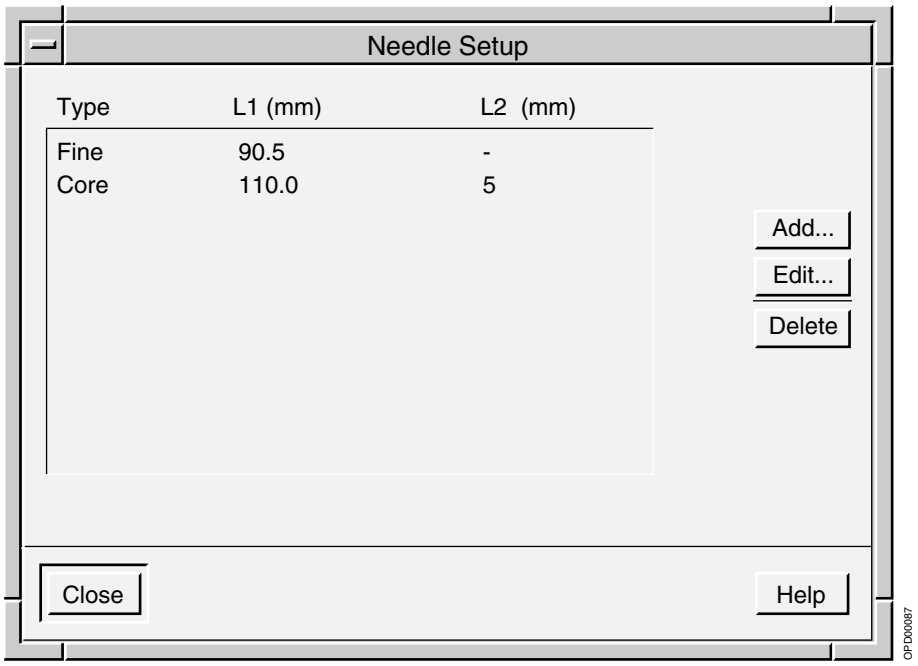

Fig. 7 Setting up needles dialog

2. Press Add... .

   You can only add needles which match the needle guides with the fixed diameters: 0.7, 0.9, 1.2, 1.65, or 2.1 mm.

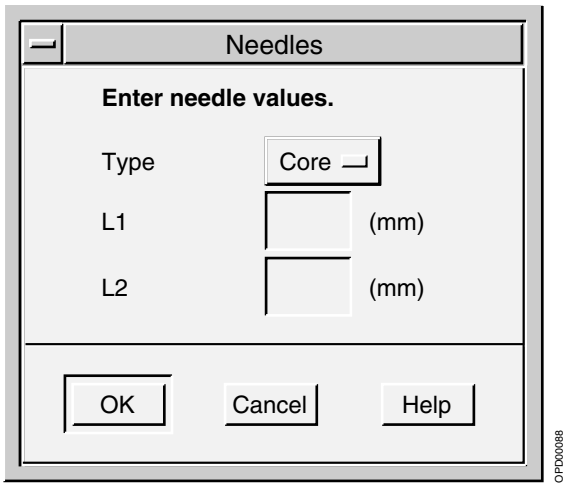

Fig. 8 Needle values dialog

3. Select needle type (fine or core) from the option menu and enter needle length in the text field.

   L1 shall be 30 to 175 mm when selecting fine needle, L2 is not applicable for fine needle. When selecting core, L1 shall be set to <170 mm.

CAUTION

Ensure by measuring the length of the specified needle or core gun with needle that the right values are entered.

If the stroke length of the core gun is changed, a new needle has to be selected from the Targets dialog. The core needle length L1 shall be measured with the core needle in outer position and mounted in the core gun.

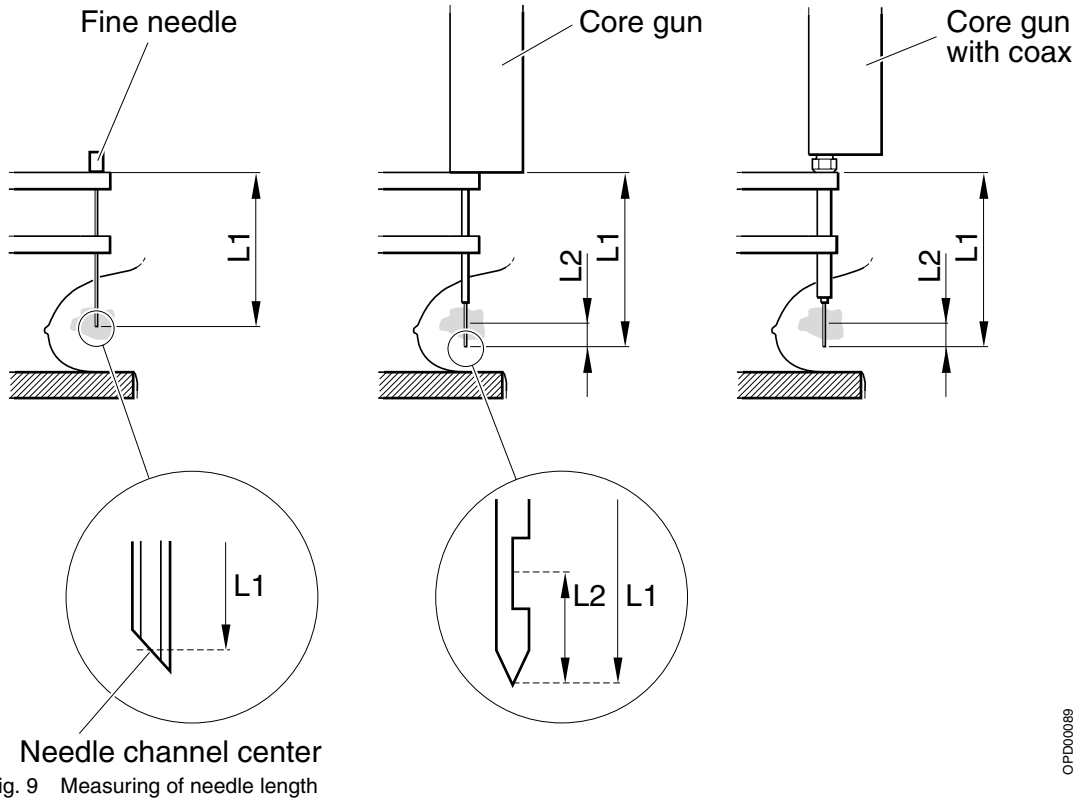

Fig. 9 Measuring of needle length

NOTICE

When using core gun, the system safety margin to avoid hitting the biopsy table is 5 mm.

Editing needle values

1. Select a needle from the needle setup dialog.
2. Press Edit... .

Backup of temporary storage media

As a service user it is possible to make a complete backup of all folders existing on the temporary storage media (the hard disk).

1. Press the Backup button in the service dialog.

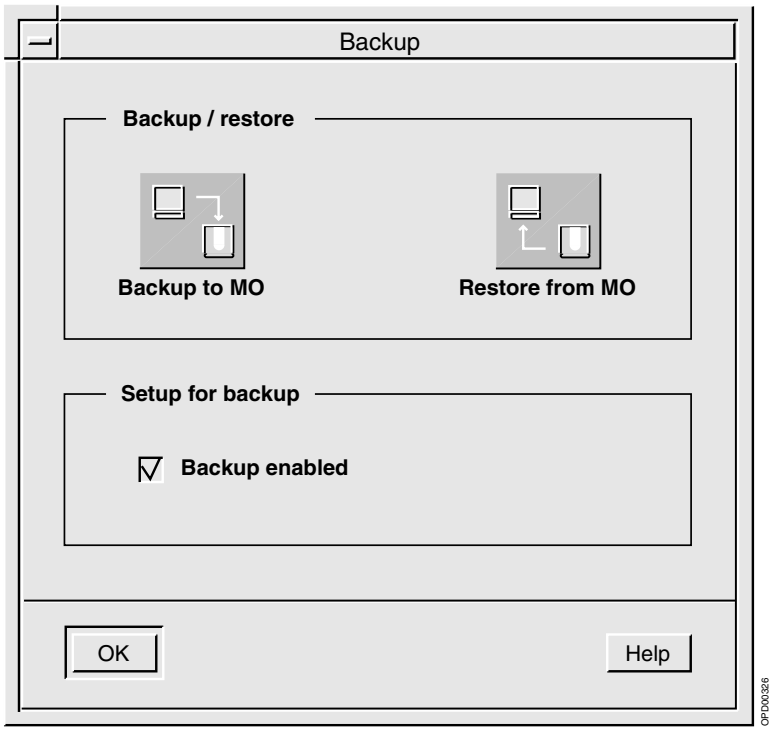

Fig. 10 Backup dialog

2. In the setup for backup section disable the backup.
3. Press the Backup to MO button.
4. Follow the instruction given in the message dialogs.
5. Enable the backup in the backup dialog.

⚠WARNING

Backup of temporary storage media cannot replace the regular use of backup described in Using the Backup function in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

Backup of temporary storage media only saves the content present on the hard disk at the actual moment. Images may have been erased by the disk cache system (see Page 5 - 24) or software reinstallation.

NOTICE

This backup might take a long time and require several MO disks since all folders on hard disk will be copied to backup MO.

Use of Advanced service functions

General

To get access to the advanced service menu you have to log in with the user name “service”. The password is obtained from Siemens Uptime Service Center (or from Headquarter Support Center).

The advanced service is carried out by using a number of text dialogs. Selection of an item in a dialog can be done in three different ways:

- Use the up/down arrows of the keyboard to step through the fields (underlined)
- Use the space bar to step through the fields
- Type the corresponding number or letter of the item

Press Enter to execute.

Main menu

The main menu is used to access all the advanced service functions.

1. Press the Advanced service button in the service dialog.
2. Select a function from the menu.

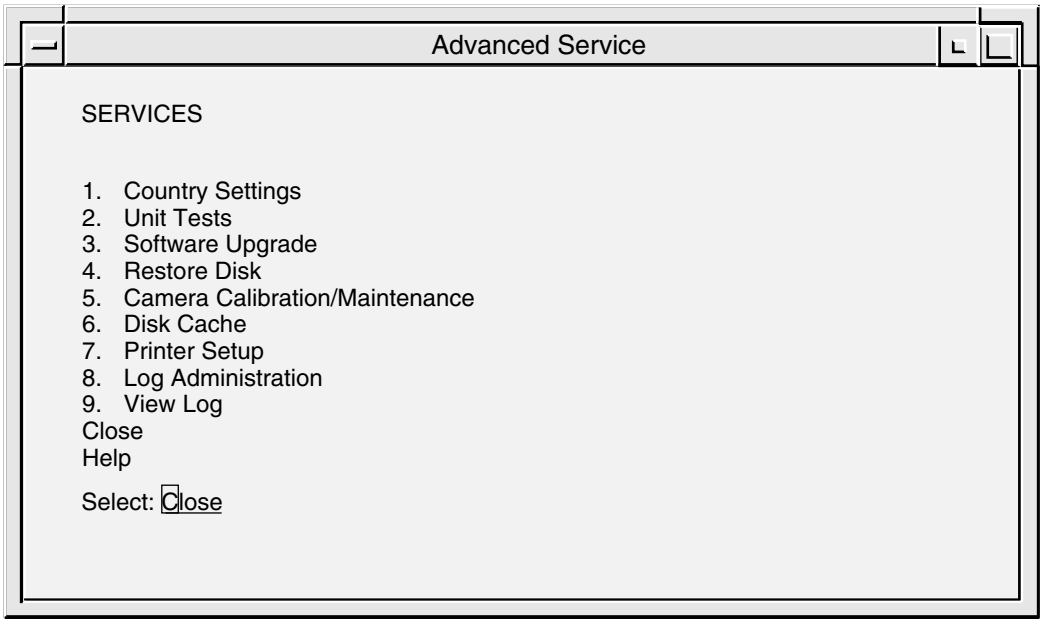

Fig. 11 Advanced service dialog

Country Settings	Function for selection of country of installation (your country).
Unit Tests	Function for performing tests of subassemblies.
Software Upgrade	Function for performing upgrade of software and for modifications of software.
Restore Disk	Function for restoring data from MO disk.
Camera Calibration/ Maintenance	Function for performing installation and maintenance of CCD camera.

Disk Cache	Function for disk cache settings.
Printer Setup	Function for setup of printer.
Log Administration	Function for log settings.
View Log	Function for inspection of logs.
Close	Function for leaving the advanced service mode.

Country settings

National parameters are set in the country settings dialog. On delivery it contains default settings.

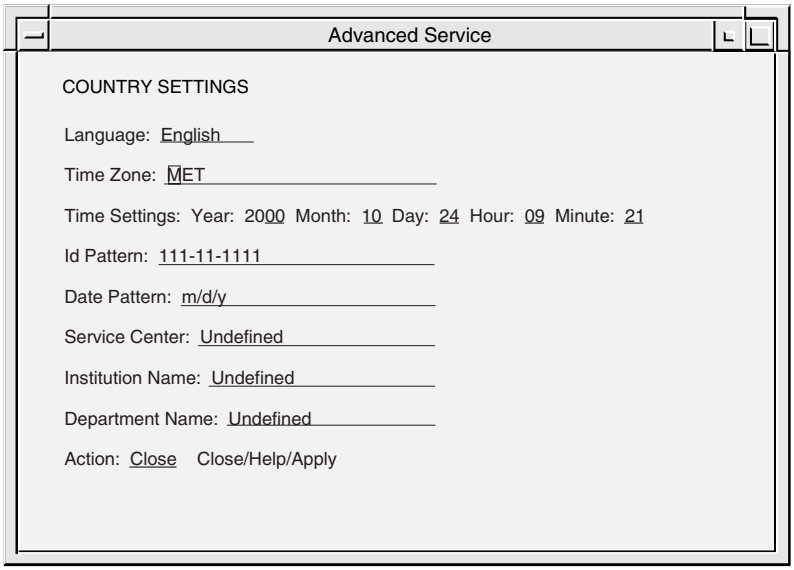

Fig. 12 Country settings dialog

Available Languages	Shows the languages currently available by the system.
Language	Selection of language in the dialogs. Select with space bar. If language is changed, log out and log in to make the change take effect.
Time Zone	A selection of the time zone used by the system. Select with space bar. For faster selection, type the first letter of the desired time zone name.
Time Settings	Value of system clock. If changed, Apply will reboot. **NOTICE! The database is updated every time an examination is performed or when an image is loaded from a MO disk. The system clock cannot be set to a point earlier than the last update.**
ID Pattern	Selection of ID-number structure. Type pattern with the keyboard: “1” for digit, “a” for letter, “?” for both digits and letters and an arbitrary character for punctuation mark. For example: 111-11-1111.
Date Pattern	Selection of date structure. Type pattern with the keyboard: “y” for year, “m” for month, “d” for day and an arbitrary character for punctuation mark. For example: m/d/y or y-m-d (do not type mm/dd/yy or yy-mm-dd).
Service Center	Type the appropriate service center.
Institution Name	Type the appropriate name for the institution.
Department Name	Type the appropriate name for the department.

1. Select Country Settings in the advanced service dialog.
2. Set the values for Language, Time Zone, ID Pattern, Date Pattern, Service Center, Institution Name and Department Name in each respective fields.
3. Select Apply and press Enter to execute the changes.

Test of units

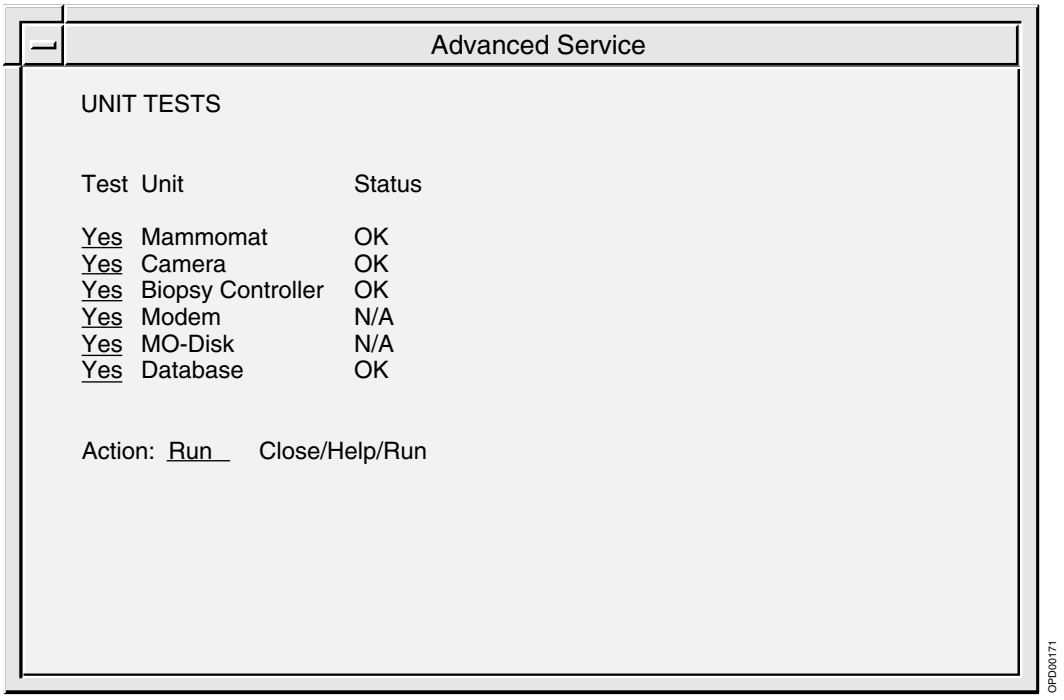

Fig. 13 Unit tests dialog

NOTICE **Before performing unit tests, the biopsy unit needs to be mounted to the MAMMOMAT. Otherwise the biopsy controller test will fail.**

1. Select Unit Tests in the advanced service dialog.
2. Select Yes or No to select/deselect the parts to be included in the test.
3. Select Run and press Enter.

Each unit that passes the test will be indicated with an OK message. If it does not pass, a Failed message will appear. Units that have not been tested are indicated with an Untested message.

The units are tested according to the following:

- MAMMOMAT - test if there is a connection and if the power is on
- CCD camera - test if there is a connection and if the power is on
- Biopsy controller - test if there is a connection and if the power is on
- Database - reading and writing in the database

Software upgrade

The software upgrade dialog is used to upgrade the current software version with a new version from CD-ROM and to do modifications of the software.

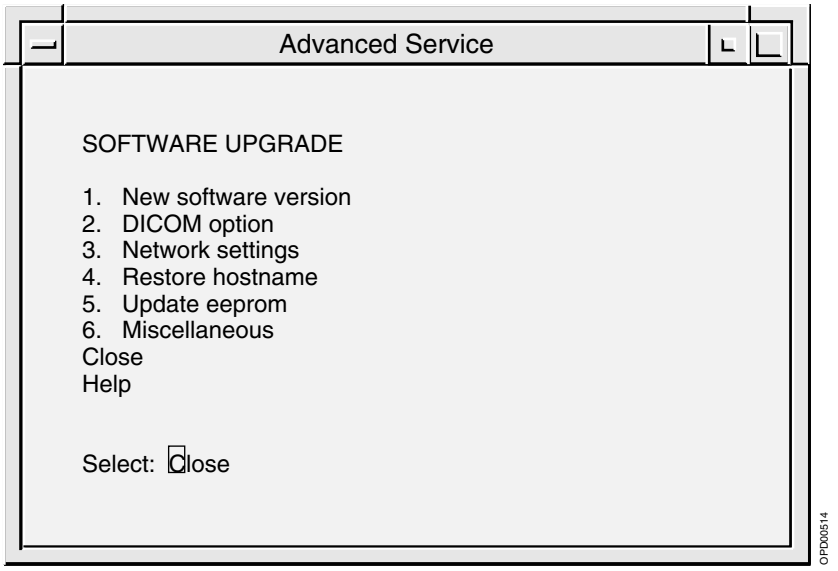

Fig. 14 Software upgrade dialog

New software version	Upgrade with new version from CD-ROM.
DICOM option	Enabling the DICOM option. **NOTICE! A license key is necessary to install DICOM.**
Network settings	Function for defining the network settings for the Opdima® system.
Restore hostname	The hostname of the original workstation can be restored to a new workstation. Restore hostname from most recently used local/backup MO disk.
Update eeprom	Not applicable.
Miscellaneous	Database and MO disk utilities.

New software version

NOTICE

This menu will be used when installing the next version of software.

However it is not applicable when changing from ASW 2.1 to 3.1 because of the change of the Solaris version. If the change from ASW 2.1 to 3.1 shall be done use the present instrucions in the modification instructions when installing the new software.

CAUTION

Make sure that all examinations are stored on the MO disk before upgrading. The examinations are stored when exiting an examination or database session, see Storing data on MO disk in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

1. Select Advanced service in the Service mode.
2. Insert the CD-ROM for the new ASW software version.
3. Select Software upgrade and New software version.

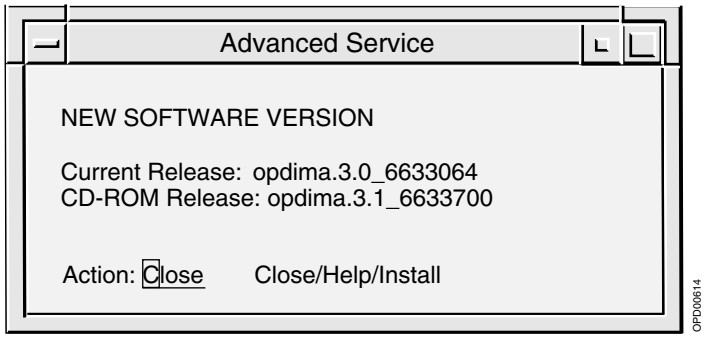

Fig. 15 New software version, advanced service dialog

4. Select Install.

Enabling the DICOM option

To enable the DICOM option you need the DICOM license key that is received when purchasing the DICOM option.

The DICOM licence is written on the invoice and the dispatch note. If not, please contact Siemens AG Medical Solutions in Erlangen, Headquarter Support Center of Special Products Division (Dept. CS HSC 24) via phone (+49/ (0) 9191 18 8080.1.6.3) for further information. This department will ask for serial No. and host ID of the workstation in question.

Instruction for obtaining the systems host ID and hostname

1. Switch on the workstation.
2. Log in as service user.
3. Press the **Control**, **Alt**, **Shift** and **!** keys at the keyboard simultaneously.
4. Switch to default behavior?
   Press OK. The screen will flash for a second.
5. Place the mouse pointer on the screen background and press the rightmost mouse button.
6. Select New window.
7. Type "`hostname`" and press Enter.

NOTICE	**Note the hostname (opdxxxx) shown on the screen.**

8. Type "`hostid`" and press Enter.

NOTICE	**Note the host id (xxxxxxxx) shown on the screen.**

9. Type "`exit`" and press Enter.
10. Press the **Control**, **Alt**, **Shift** and **!** keys at the keyboard simultaneously.
11. Switch to custom behavior?
    Press OK. The screen will flash for a second.
12. Done!

DICOM option

1. Select Advanced service in the Service mode.
2. Select Software Upgrade.
3. Select DICOM option.

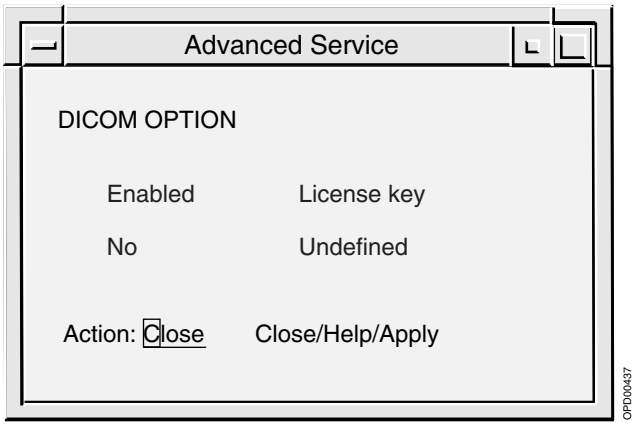

Fig. 16 DICOM option, advanced service dialog

4. Select Yes.
5. Enter License key and Apply.
6. Select y to reboot.
7. Configure DICOM nodes according to Network Setup in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

Network settings

Enable network

1. Select Advanced service in the Service mode.
2. Select Software upgrade and Network settings.
3. Supply appropriate values for the network settings into the fields and apply. (The values shall be supplied by the network administrator at the hospital.)

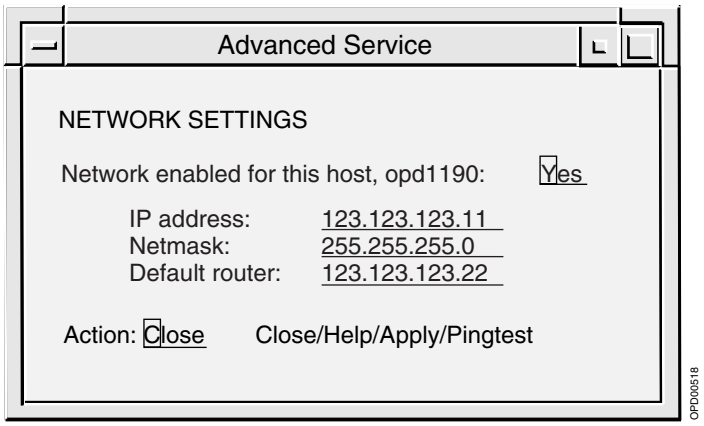

Fig. 17 Network settings

IP address	Address for the system in the network, written as four decimal numbers separated by periods, e.g. 123.123.123.11. No initial 0, e.g. 10.10.10.10 is OK but 010.010.010.01 is not OK.
Netmask	Netmask used in the network if IP standard subnetting is used.
Default router	The IP address of the default router, if this is used in the network. No initial 0, e.g. 10.10.10.10 is OK but 010.010.010.01 is not OK.

4. Select y to enable the network. The workstation will be turned off.
5. Connect the network cable.
6. Switch on the workstation.

Pingtest

A pingtest checks that the default router is alive, it can be performed when the network is enabled.

1. Select Pingtest in the Network settings dialog.

NOTICE	**Some alive routers do not reply to pingtest, check with network administrator.**

To test if a host is alive or not, write the IP address temporarily in the field for Default router and perform a pingtest.

Miscellaneous

1. Select Advanced service in the Service mode.
2. Select Miscellaneous.

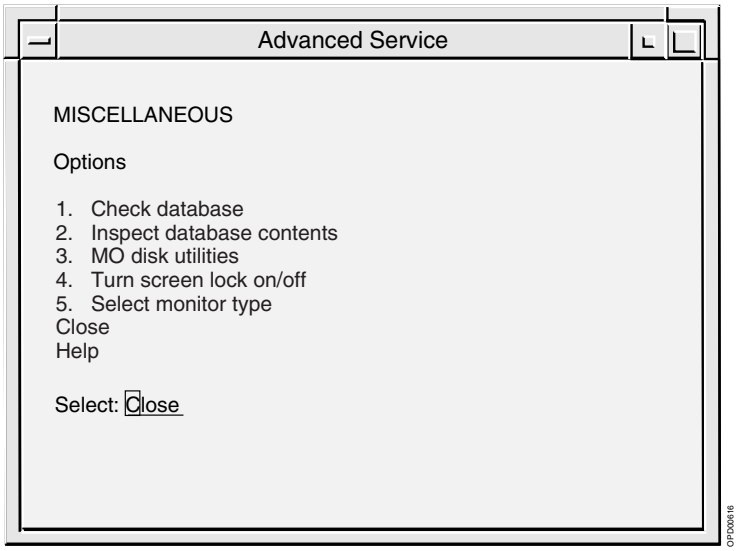

Fig. 18 Miscellaneous, advanced service dialog

Check database

This will check and adjust invalid folder names that may have been introduced in earlier software versions.

1. Select “Check database” in the miscellaneous dialog.

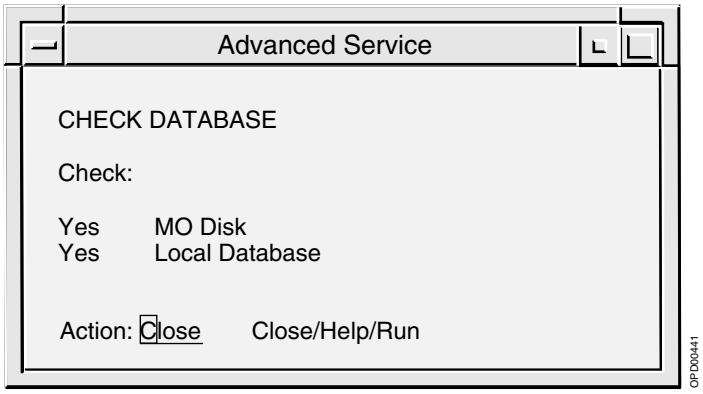

Fig. 19 Check database, advanced service dialog

2. Select the database to check, MO Disk and/or Local Database.
3. Select Run.

Inspect database contents

1. Select “Inspect database contents” in the miscellaneous dialog.
   A Text Editor window with a log file will appear on the screen, see example in Appendix 1.

NOTICE	**The log file is only a print-out of the data in the database. Changes in the log file will NOT affect the database.**

2. When done, close the Text Editor window.

MO disk utilities

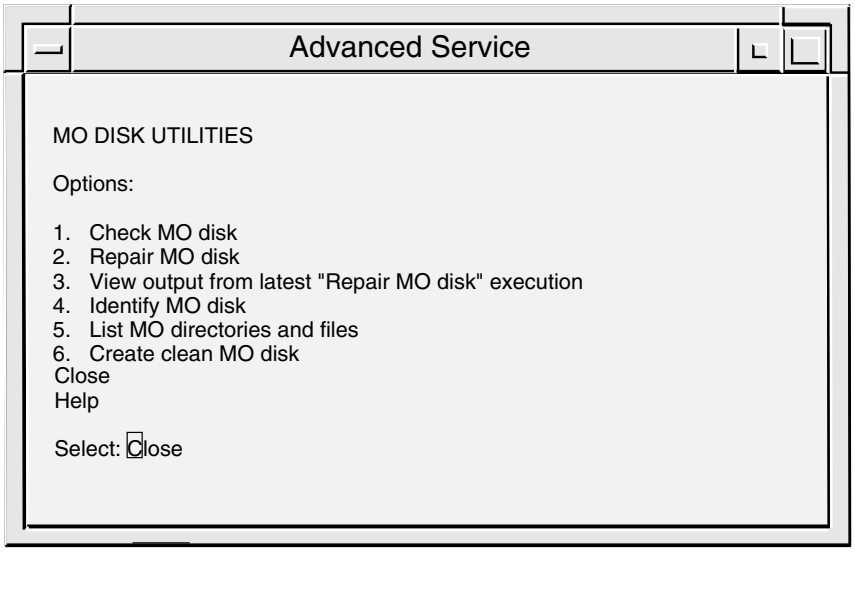

Fig. 20 MO disk utilities, advanced service dialog

Check MO disk	Check MO disk file system integrity.
Repair MO disk	Repair MO disk file system. **NOTICE! Run only if Check MO disk shows that something has to be done.**
View output	Lists output from latest “Repair MO disk” execution.
Identify MO disk	Shows the kind of disk (local storage/backup/transfer...).
List MO directories and files	View contents of MO disk.
Create a clean MO disk	Format a new disk or erase contents of a formerly used disk. **WARNING! Use with extreme caution. Erases all content on MO disk.** **WARNING! When using this function, It is only possible to use a 9.1 GB MO disk.**

Turn screen lock on/off

In this dialog it is possible to enable or disable the screen lock function.

1. Select “turn screen lock on/off” in the miscellaneous dialog.

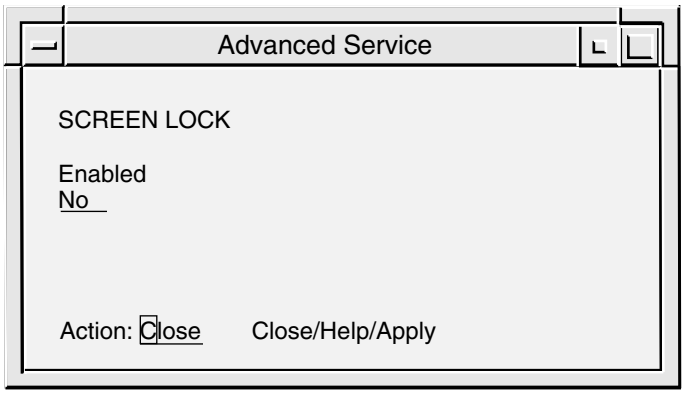

Fig. 21 Turn screen lock on/off, advanced service dialog

2. Select Yes to turn the screen lock on or No to turn it off.
3. Select Apply.

NOTICE	To enable the new settings log out and log in again.

Select monitor type

In this dialog it is possible to select monitor type.

⚠WARNING	Changing the refresh rate shall be used with extreme caution and only if instructed to do so.

1. Choose “select monitor type” in the miscellaneous dialog.

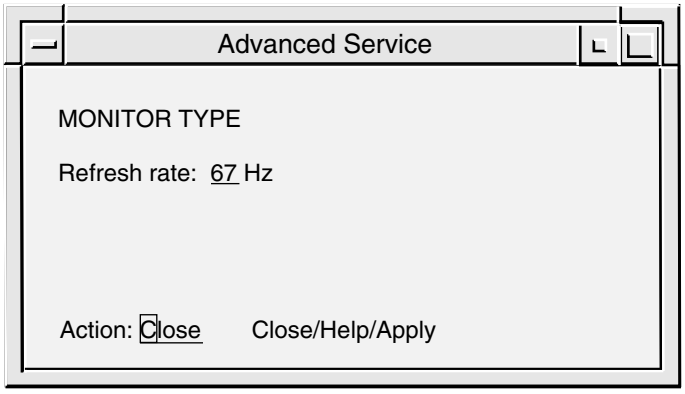

Fig. 22 Turn screen lock on/off, advanced service dialog

2. Select refresh rate according to the chapter Installation of monitor in the Installation and Start-Up Instructions.
3. Select Apply.

NOTICE	To enable the new settings reboot the system.

Restoring data from MO disk

Copies the database from the MO disk to the hard disk. It is possible to use a local storage MO disk or a backup MO disk.

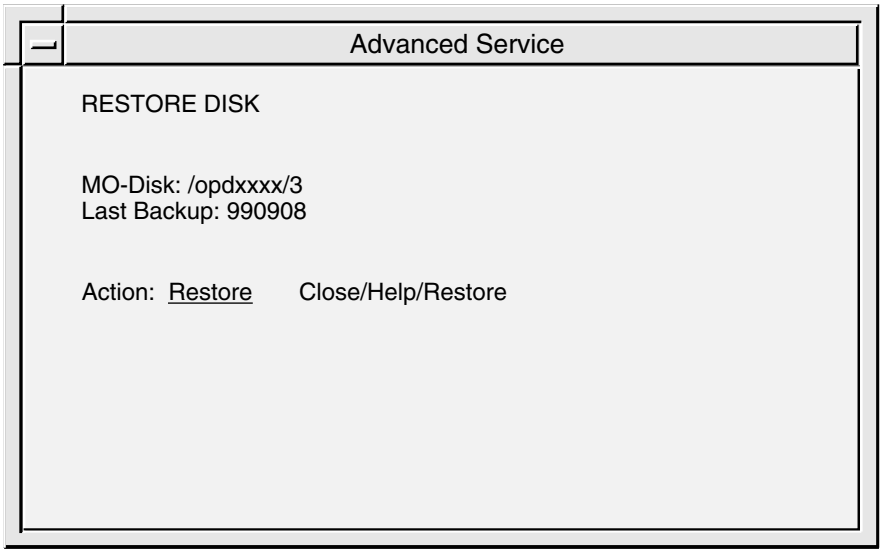

Fig. 23 Restore disk dialog

MO disk	Name of the inserted MO disk.
Last backup	Last date for storing on the MO disk.

1. Insert the most recently used MO disk in the MO unit.
2. Select Restore Disk in the advanced service dialog.
3. Select Restore and press Enter to copy the data to the hard disk.

⚠WARNING

When restoring data, be sure to insert the MO disk that was used most recently before the reinstallation of software.

Date for last update of MO disk is displayed on the monitor before confirmation of restore.

If the system is restored from an older MO disk, the most recent folders will be lost from the database and the new MO disk numbering can be incorrect. Please contact HSC for more information.

NOTICE

Set up the printer once again after software reinstallation. Printer info can not be restored.

CCD camera calibration and maintenance

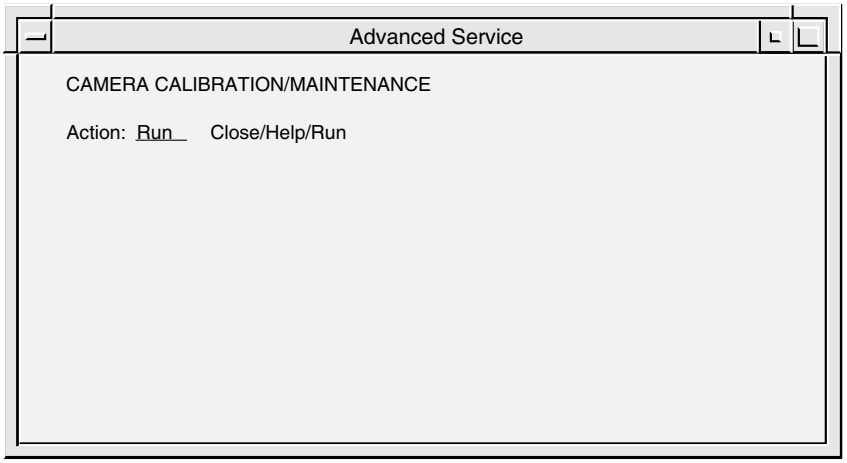

Fig. 24 Camera calibration/maintenance

NOTICE	**This calibration shall be performed with the object table (grid or non grid) that the customer is going to use in most cases.**

NOTICE	**Do not use the stereo table when calibrating.**

Fill in your values in the test protocol for CCD camera calibration (see Appendix 2).

Grid table

1. To avoid grid lines in the calibration images, temporary increase the grid speed during calibration as follows:
   Change the grid fast speed time to 1500 ms, the grid fast speed to 99% of max and the grid slow speed to 40% of max (Fig. 25) using the service PC.

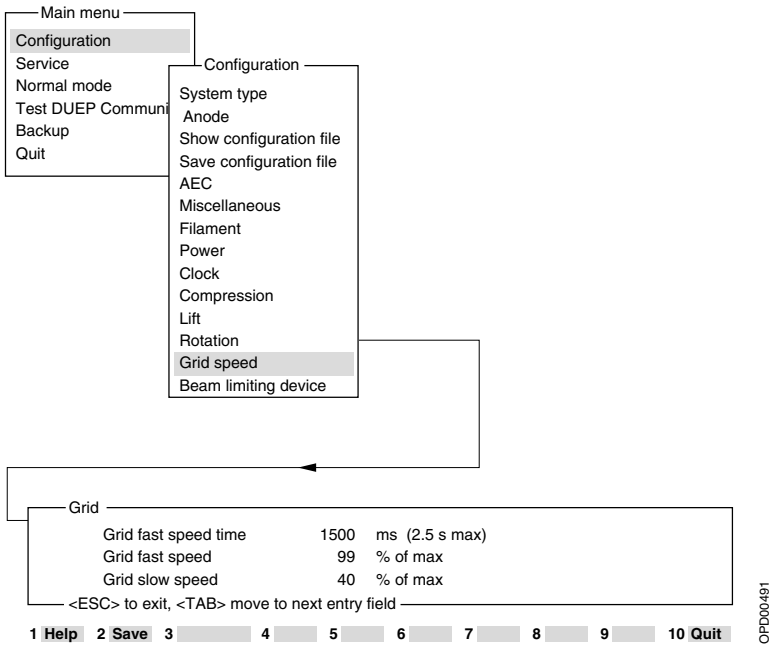

Fig. 25

2. Place 2 plates calibration plexiglas 19 mm on the table, covering the CCD.
3. Select Camera Calibration/Maintenance in the advanced service dialog.
4. Select Run and set 27 kV, Mo/Mo and AEC mode, on the generator.
   Follow the instructions displayed on the screen.

   Between each exposure the acrylic plastic shall be moved slightly (the reason being that impurities in the plastic shall not influence the calibration).
   After the exposure series, correction tables will be calculated. This will take 10 minutes at most.

   After a successful calibration (10 exposures in each mode - normal resolution and high) the message “Camera successfully calibrated” will appear on the screen.
5. Change the grid speed back to original values.
6. Perform check of Opdima® AEC and check of resolution. See Check of Opdima AEC on Page 10 - 2 and Check of resolution on Page 10 - 4.

Non grid table

1. Place 1 plate calibration plexiglas 19 mm and one plate calibration plexiglas 9.7 mm on the table, covering the CCD.
2. Select Camera Calibration/Maintenance in the advanced service dialog.
3. Select Run and set 26 kV, Mo/Mo and AEC mode, on the generator.
   Follow the instructions displayed on the screen.

   Between each exposure the acrylic plastic shall be moved slightly (the reason being that impurities in the plastic shall not influence the calibration).
   After the exposure series, correction tables will be calculated. This will take 10 minutes at most.

   After a successful calibration (10 exposures in each mode - normal resolution and high) the message “Camera successfully calibrated” will appear on the screen.
4. Perform check of Opdima® AEC and check of resolution. See Check of Opdima AEC on Page 10 - 2 and Check of resolution on Page 10 - 4.

Disk cache settings

Storage parameters can be set in the disk cache dialog:

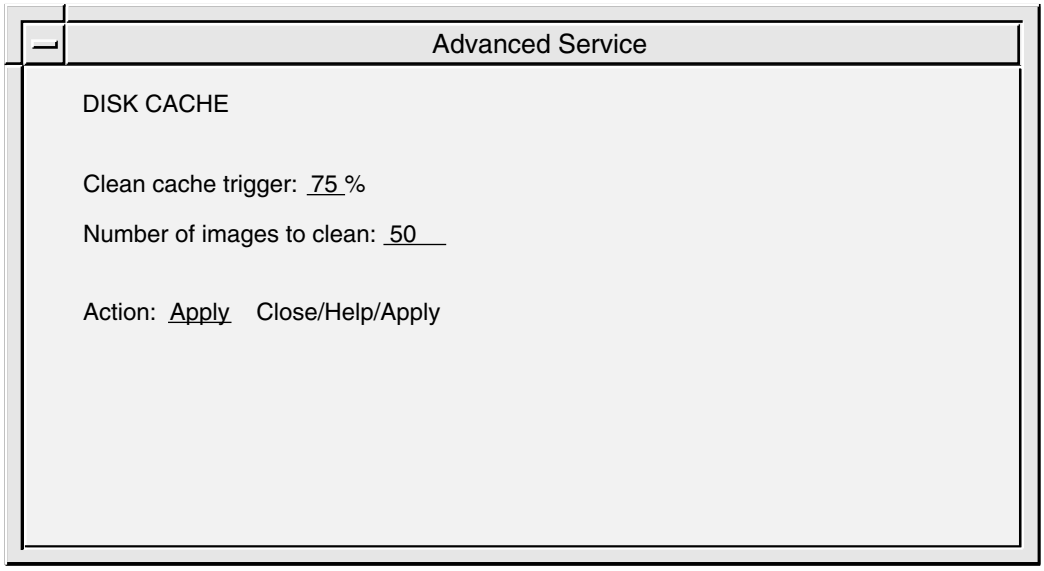

Fig. 26 Disk cache dialog

Clean cache trigger	Cleans a number of images from the cache memory (the temporary storage media i.e. hard disk) when it has been filled up to a percentage of the capacity. Normally set to 75%.
Number of images to clean	The number of images to erase once the trigger level has been reached. Normally set to 50.

1. Select Disk Cache in the advanced service dialog.
2. Set the values.
3. Select Apply and press Enter.

Every time an examination is performed a folder containing the image file, the image icons and the image header file is created. When an examination is finished the complete folder is copied to the MO disk. If a folder has been copied to a MO disk, its images will be erased from the hard disk if the cache limit is reached.

Use of printer setup

Stand alone Opdima system

NOTICE	Connection of stand alone printer used for screen dump.

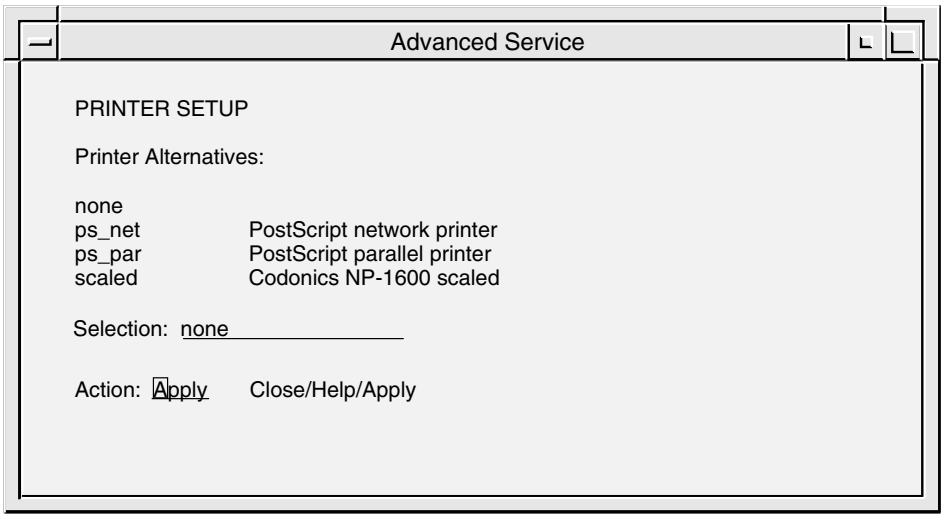

Fig. 27 Printer setup dialog

1. Select printer by pressing the Space button.

   1.1 ps_net: PostScript network printer, for postscript printer connected to the network connector of the workstation see 7/Fig. 9 on Page 6 - 9. The printer IP address has to be set to 10.10.10.2.

   1.2 ps_par: PostScript parallel printer, for postscript printer connected to the parallel port of the workstation see 8/Fig. 9. on Page 6 - 9.

   1.3 scaled: Codonics NP-1660 or NP-1600 scaled, for a Codonics printer connected to the network connector of the workstation see 7/Fig. 9 on Page 6 - 9. The printer IP address has to be set to 10.10.10.2.

2. Select Apply and press Enter.
3. Connect your selected printer after turning off the system.

NOTICE	If no printer is connected select none, apply and restart the system.

Networked Opdima system

NOTICE	Connection of networked printer used for screen dump.

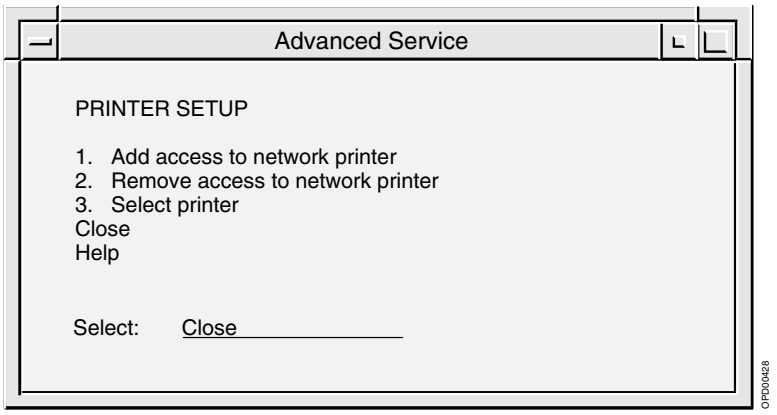

Fig. 28 Printer setup dialog when connected to a network

When the Opdima® system is connected to a network (see Page 5 - 17) it can be configured to print on a printer connected to the network. Supported printer types are postscript printers and printers that can handle XWD files (X Window Dump).

Add access to network printer

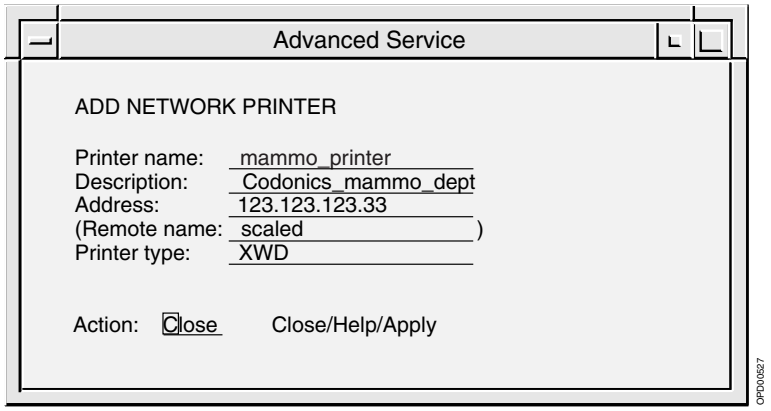

Fig. 29 Add network printer dialog

Printer name: Logical name presented when selecting printer in Advanced service. No space characters are allowed. E.g. mammo_printer.

Description: Textual description, for example the location of the printer. E.g. Codonics_mammo_dept.

Address: IP address for printer, e.g. 123.123.123.33.
No initial 0, e.g. 10.10.10.10 is OK but 010.010.010.01 is not OK.

Remote name: Name of printer at remote system. No space characters are allowed.
NOTICE! The remote name “scaled” must be used when using a Codonics printer.

Printer type: PS or XWD. Use PS for all postscript printers.
NOTICE! XWD shall be used with Codonics printers.

Select printer

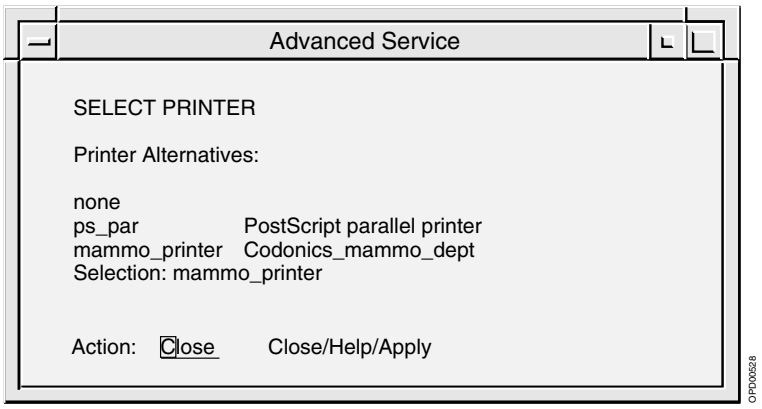

Fig. 30 Select printer dialog, example

Note that only ps-par and network printers that have been added can be selected when the network has been enabled for the system.

Remove access to network printer

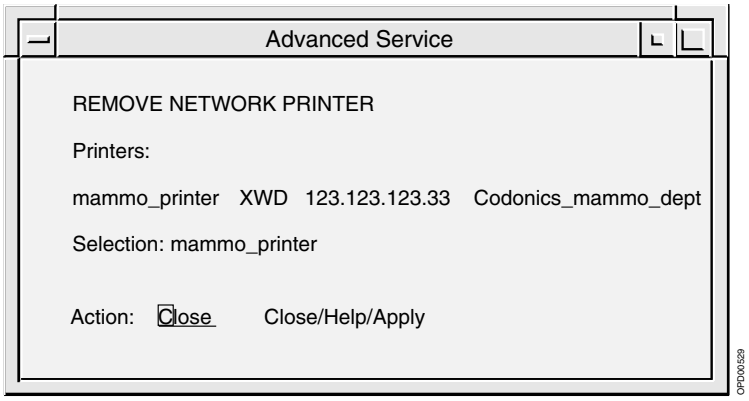

Fig. 31 Remove network printer dialog, example

Previously defined printers can be removed from the list of printers. Note that the printer that is currently selected cannot be removed.

Log administration

Log files are stored on the temporary storage media and on the MO disks. In the log administration dialog, the logging can be turned on/off.

⚠WARNING	**Do not disable loggings unless especially specified to do so.**

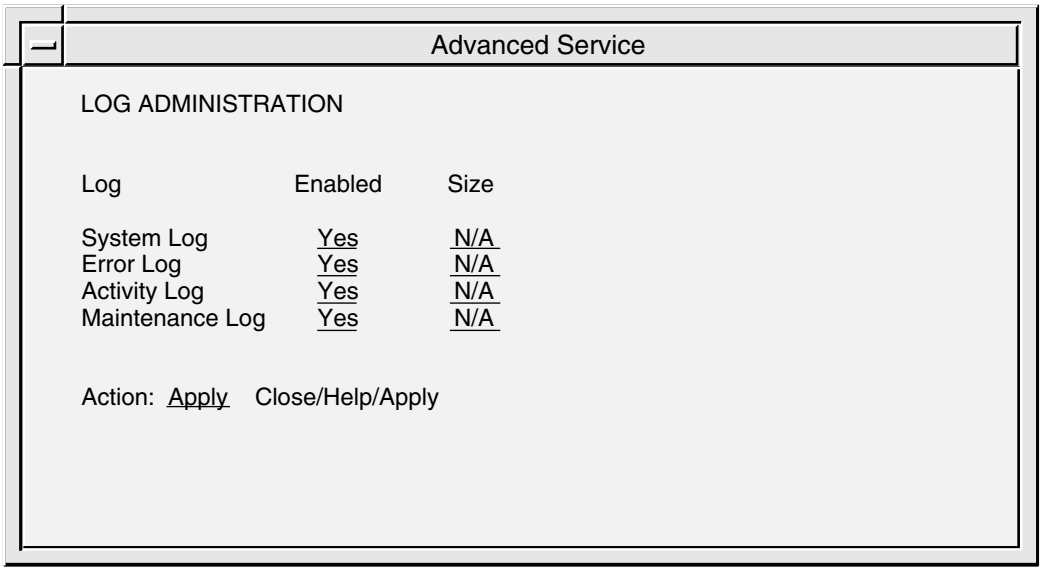

Fig. 32 Log administration dialog

1. Select Log Administration in the advanced service dialog.
2. Select Yes/No to turn on/off each respective log.
3. Select Apply and press Enter.

Log inspection

Through the view log dialog, the log files can be inspected.

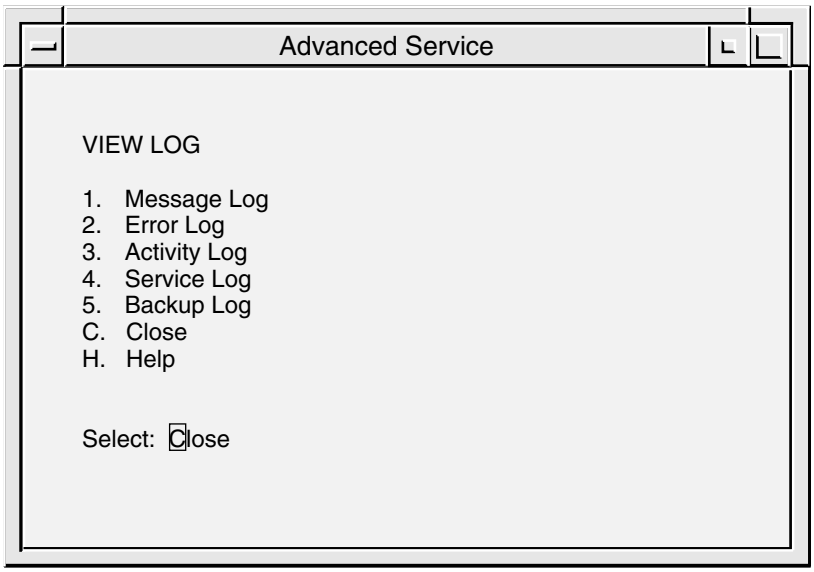

Fig. 33 View log dialog

Message Log	Log for messages presented to the user.
Error Log	Log for Opdima® related errors.
Activity Log	Log for all user activities.
Service Log	Log for activities in service mode.
Backup Log	Log for activities made in backup mode.
Close	Function for leaving the view log dialog.

1. Select View Log in the advanced service dialog.
2. Select a log from the menu in the view log dialog.

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General

After performing hardware service, protective earth measurement has to be performed, see Protective earth measurement on Page 10 - 5.

⚠WARNING	**Switch off the power to the system at the main circuit breaker after power off.**

CAUTION	**If the workstation shall be powered off, use the “poweroff” command and make sure that the system has completed the process before switching off any main power. If power to the workstation is disabled during the power off sequence or without using the “poweroff” command, data could be lost.**

MO unit

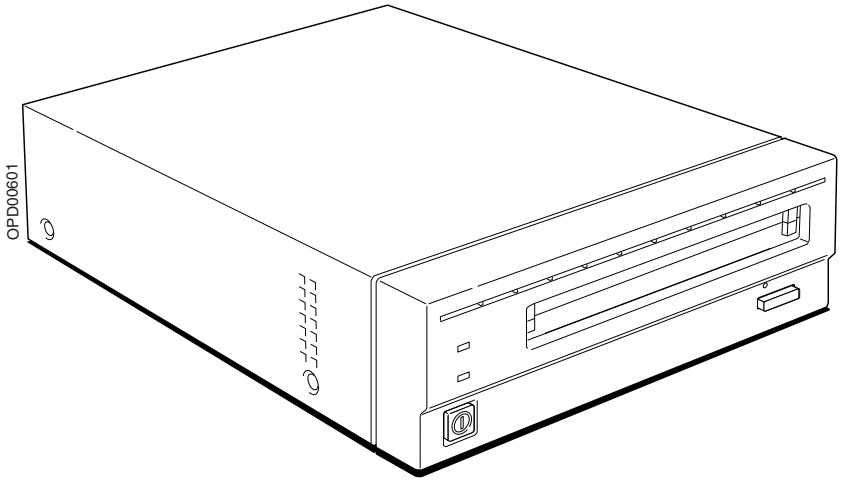


Fig. 1 The MO unit, front view

Removing the MO unit

NOTICE	**If MO unit is defective, the complete unit must be replaced.**

1. Disconnect the power supply cable (AC in) and SCSI cable from the back of the unit (Fig. 2).
2. Unplug the SCSI terminator from the back of the unit (Fig. 2).
3. Remove the unit.

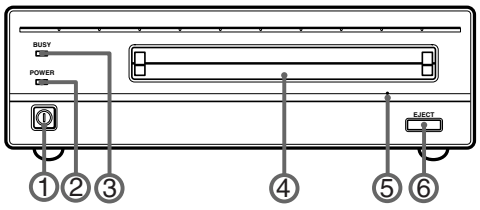
Installing the MO unit

NOTICE

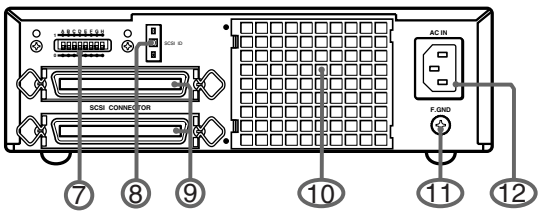
Make sure that the SCSI cables are properly connected and fixed to the units and that the cable behind the MO unit is not bent to much. Also, check that the MO unit is terminated correctly. If not, this might generate a lot of problems e.g. failure to write images to MO disk, corrupted MO disk or corrupted hard disk.

SCSI ID	Disk drive type	Disk drive function
1	Magneto-optical drive	Permanent storage and backup media (MO disk)

Front Panel



Rear Panel



① POWER switch

② POWER indicator

③ BUSY indicator

④ Disk insertion slot

⑤ Emergency eject hole

⑥ EJECT button

⑦ Function switches

⑧ SCSI ID switch

⑨ SCSI connectors

⑩ Air duct

⑪ F.GND (frame ground) terminal

⑫ AC IN (AC power) connector

OPD00625

Fig. 2 MO unit, front and rear panel

1. Set SCSI ID switch to 1 (SCSI address).
2. Set the function switches (see pos 7 / Fig. 2) according to Fig. 3.

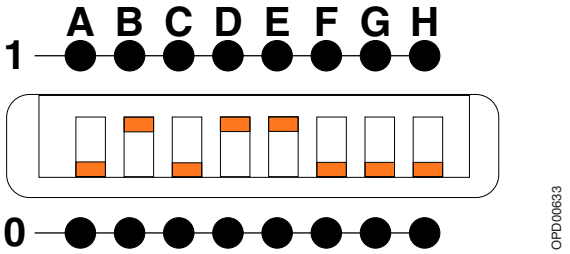


Fig. 3 Function switches setting

3. Connect the power supply cable, the SCSI terminator and the SCSI cable to the unit.

Tests and Adjustments

1. Switch on the system.
2. Ensure that the system is operating properly.

Biopsy controller

Removal of biopsy controller

The biopsy controller is attached to the stand rear side. To remove the unit proceed as follows:

1. Remove the CCD camera and store it in its attaché case.

CAUTION

Do not touch the pins in the contacts of the camera.

The CCD camera is sensitive to mechanical shock and shall always be stored in the attaché case when disconnected from the biopsy controller.

2. Remove the biopsy controller cable duct.
3. Disconnect all cables.
4. Lift off the biopsy controller (1/Fig. 4) from the holders of the stand (2/Fig. 4).

⚠WARNING

If the MAMMOMAT power is switched on, there is mains voltage present at the biopsy controller mains cord connector.

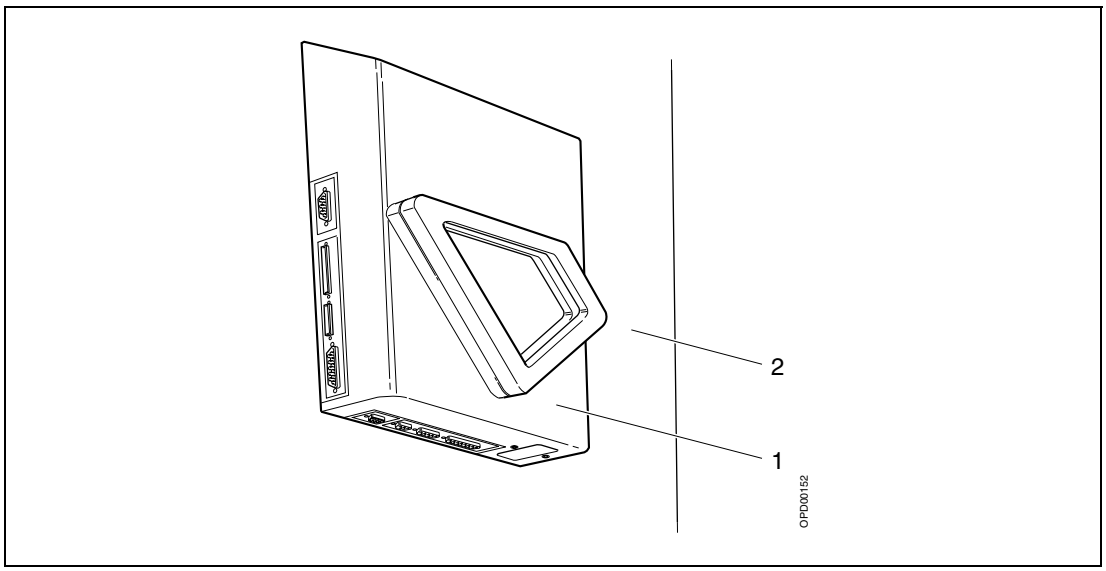


Fig. 4 Biopsy controller

Removal of biopsy controller cover

To remove the cover of the biopsy controller, proceed as follows:

1. Remove the 13 screws (4/Fig. 5) on the back side of the biopsy controller.
2. Remove the seven countersunk screws (2/Fig. 5) on the sides of the biopsy controller.
3. Lift off the cover, starting at the top.

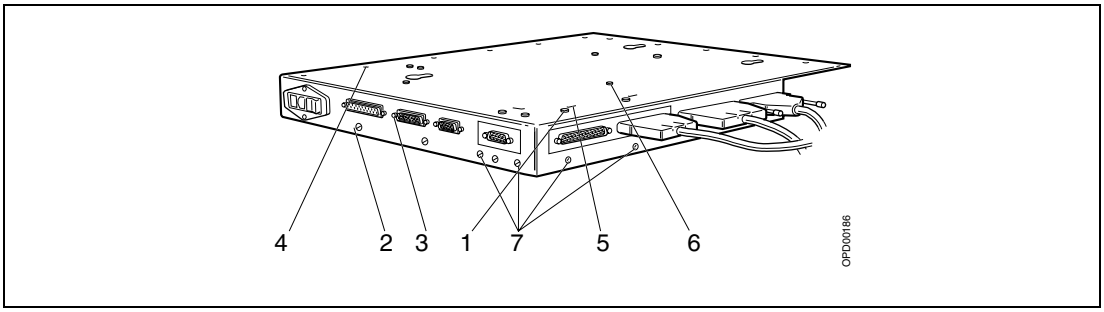


Fig. 5 Removal of cover

Replacement of components in the biopsy controller

Replacement of board D200

To replace the board D200 in the biopsy controller, proceed as follows:

1. Remove the screws (3/Fig. 5) holding the connectors X201, X202, X206, X207, X208.
2. Loosen the four screws (1/Fig. 5) on the back side of the biopsy controller.
3. Loosen the four screws (7/Fig. 5) on the side of the biopsy controller.
4. Remove the screws (6/Fig. 5) holding the board.
5. Remove the board and install the new board. If necessary, loosen the transformer.

   Make sure to replace the isolation film at the connectors X203, X204 and X205.

   When installing the board, pry the board holders carefully in position by using a screwdriver at the slots (5/Fig. 5) on the back side of the biopsy controller.
6. With an ohm meter verify that the isolation film at connectors X203, X204 and X205 is functioning properly. The resistance shall be in excess of 10 MΩ, when measuring between the back side of the biopsy controller and the shielded housing surrounding the pins of the connectors X203, X204 and X205. If the resistance is less than 10 MΩ, the isolation film has to be replaced.

NOTICE

If Led V2 (NVM error) and error message “Biopsy unit not responding” appear after replacement of D200, follow the procedure described in Initialization of BC nvram on the D200 board on Page 9 - 2.

Replacement of fuse in mains filter

The mains filter (3/Fig. 6) contains a fuse. To change fuse, proceed as follows:

1. Remove the fuse holder (1/Fig. 6) from the filter using a screwdriver and remove the old fuse (2/Fig. 6).
2. Install a new fuse in the fuse holder.
3. Insert the fuse holder into the filter according to Fig. 6.

CAUTION **The new fuse must be placed in the same position as the old one and the marks on the fuse holder and the mains filter must coincide, see Fig. 6.**

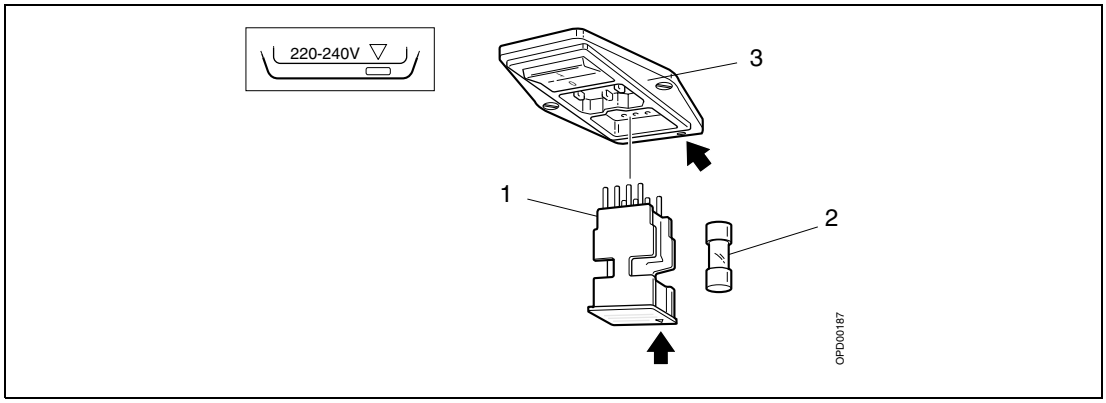


Fig. 6 Fuse in mains filter

Replacement of fuses on printed circuit board, D200

Fuses on the board D200 in the biopsy controller can be exchanged. The location of the fuses is shown in MAMMOMAT 1000/3000 Nova - Opdima® Wiring Diagram.

Replacement of EPROMs

To replace the EPROMs of the board D200 in the biopsy unit, proceed as follows:

1. Use PROM extractor to remove the EPROM.
2. Install the new EPROM.

Cables

The biopsy controller is the central unit for the cable connections. The cables are connected to the biopsy controller according to the figure below:

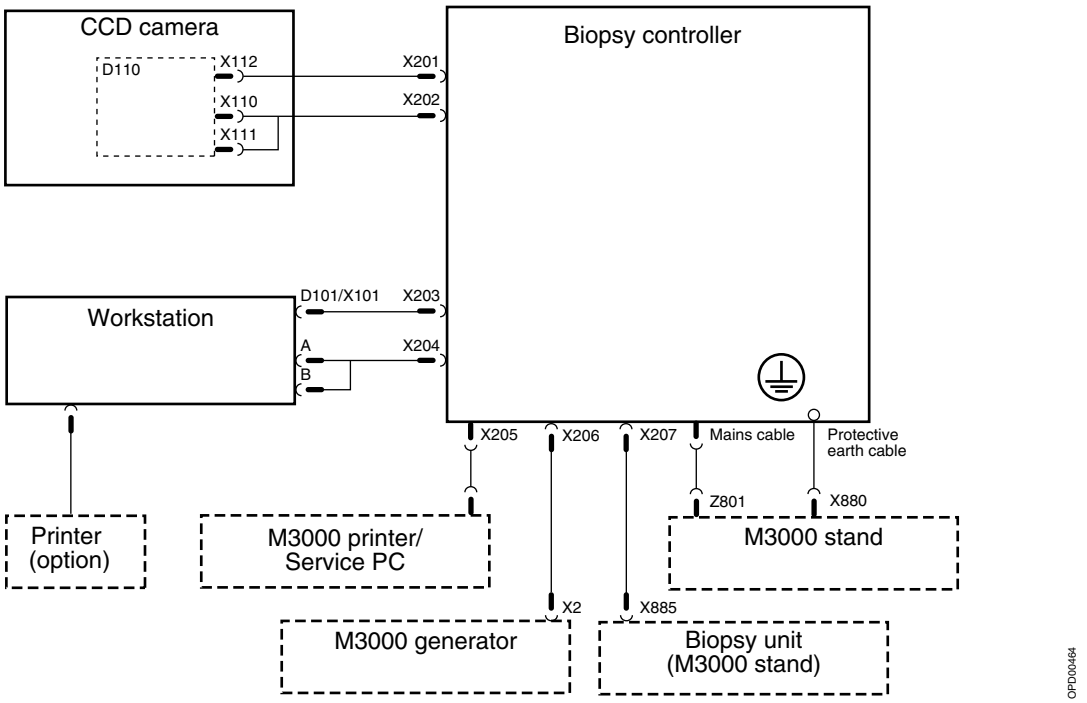


Fig. 7 Connection of cables

Biopsy unit

After any repair on the biopsy unit the accuracy has to be tested with the stereo calibration phantom and if necessary a calibration of the biopsy unit has to be performed.

Workstation

Connectors

CAUTION **Connecting the cable to the wrong connector may cause severe damage to the equipment.**

CAUTION **If the workstation table (option) is used, the main unit shall be placed on the table top, lying down, beneath the monitor.**

Front panel description

Position	Explanation
1	Power switch
2	Power-indicator LED
3	Smart card reader (not used in Opdima)
4	3.5-inch diskette drive (not used in Opdima)
5	5.25-inch CD drive

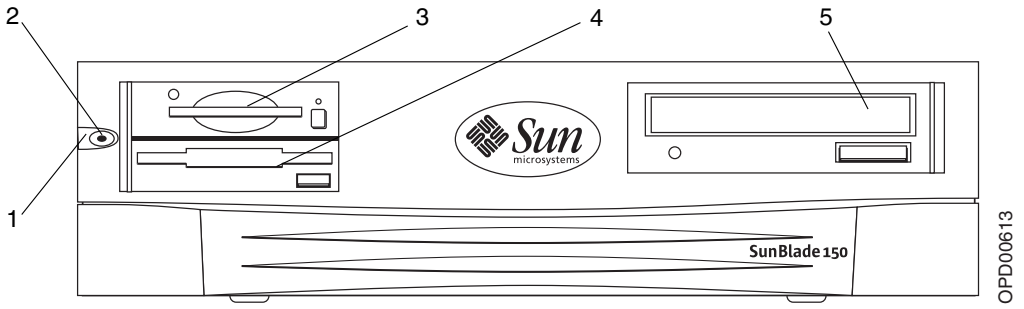


Fig. 8 Front panel overview

Back panel description and connector symbols

Position	Explanation	Connector symbols
1	Mains power supply	None
2A	Biopsy controller interface (X204)	**PCI-3**
2B	Camera interface via biopsy controller (X203)	**PCI-2**
2C	SCSI interface	**PCI-1**
3	Universal serial bus (USB) connectors (four) (keyboard and mouse interface)	
4	Network connector	
5	Not applicable (IEEE 1394 (two) connectors), not used	
6	Monitor interface	
7	Parallel port to local printer	//
8	Mammomat interface via biopsy controller (X204)	**SERIAL**
9	Audio module headphones connector, not used	
9	Audio module line-out connector, not used	
9	Audio module line-in connector, not used	
9	Audio module microphone connector, not used	

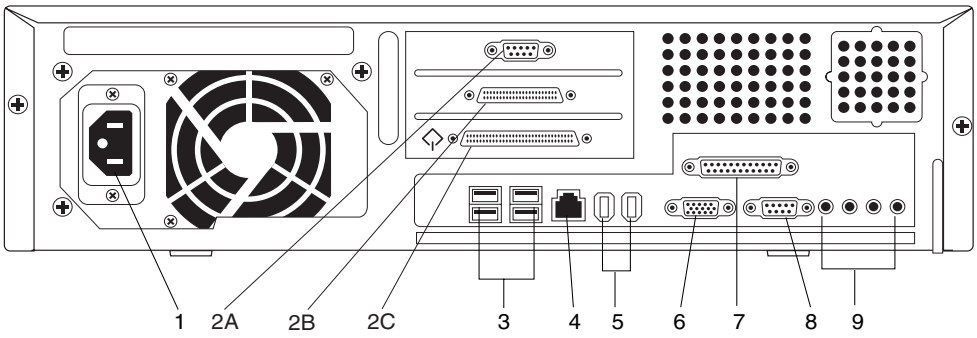


Fig. 9 Back panel overview

CCD camera

Repair of the CCD camera is not allowed.

CAUTION

The CCD camera has to be handed with extreme care, it is very sensitive to mechanical shocks and temperature. When not connected, do not touch the pins in the camera contacts. In the camera shock and temperature sensors are integrated.

After installation of a new CCD camera the following has to be performed:

1. CCD camera calibration and maintenance, see CCD camera calibration and maintenance on Page 5 - 22.
2. Verifying the calibration of the biopsy unit, see Verifying the calibration of the biopsy unit on Page 10 - 1.
3. Check of Opdima® AEC, see Check of Opdima AEC on Page 10 - 2.
4. Check of resolution, see Check of resolution on Page 10 - 4.

Reinstallation of software

After major failure, the software can be reinstalled. After this procedure no image data will be available on the hard disk. The system will prompt for appropriate local storage MO disks when viewing of images is requested.

⚠CAUTION

Before reinstalling software it is important to have a backup MO disk with the most recent data.

If no backup MO disk is available, use a local storage MO disk and perform a dummy exposure. Then the data on this local storage MO disk becomes the most recent and can be used for restoring configuration data.

Installation of Operating Solaris 8 Installation CD-ROM for, (Mat. No. 66 33 049)

NOTICE

The system hostname (opdxxxx) is needed to perform the installation. Normally the hostname can be viewed on the screen when the system is switched on. If not, use the 4 digits from the serial No. labelled on the workstation main unit to create a dummy hostname. Restore the correct hostname from a MO disk from the original system after the installation is completed, see Restore hostname and data on Page 6 - 12.

1. Switch on the MO unit and remove the MO disc (if present).
2. Switch on the workstation.
3. Enter the keys:
   Stop and A simultaneously.
   This will bring you to the OK prompt.
4. Insert the Operating environment installation CD-ROM for Opdima.
5. Type "`boot cdrom - install`" and press Enter.
6. The system reboots.
   In a few minutes, you will see a dialog box "The SOLARIS installation Program" appear. Select continue.
7. When a dialog box "Identify This System" appears, select continue.
8. When a dialog box "Hostname" appears. Enter the original hostname (opdxxxx) and select continue.
9. When a dialog box "Confirmation information" appears, select continue.
10. The installation script is running. This will take approximately 20 minutes.
11. The system reboots.

12. Login as root, no password required.
A text prompt appears asking you to insert the Opdima ASW CD-ROM.

NOTICE	**You have 20 seconds to insert the CD-ROM, otherwise the system goes back into login mode. If so start over with step 12.**

Installation of Opdima Software Installation CD-ROM (Mat. No. 66 33 700)

1. Insert the Opdima Software Installation CD-ROM.
2. Do you wish to install the required patches?
Type "y" and press Enter.
3. Do you wish to continue this installation?
Type "y" and press Enter.
This will take approx. 30 minutes.
4. To continue the installation. You have to reboot. Reboot now?
Type "y" and press Enter.
5. After reboot the installation program must be restarted. Press Enter to continue.
6. Login as root, no password required.
7. Do you wish to install the Opdima software and misc binaries?
Type "y" and press Enter.
8. To complete the installation. You have to reboot. Reboot now?
Type "y" and press Enter. A text prompt appears with the message "Ejecting CD-ROM...Done. Please remove the CD-ROM from the caddy! Press Enter to continue". Remove the CD-ROM and press Enter.

Restore hostname and data

⚠CAUTION	**If no backup MO disk is available, use the local storage MO disk with the most recent data.**

1. Log in as service user.
2. Select Service and Advanced service.
3. Insert the most recently used backup MO disk in the MO unit.
4. If the 4 digits from the serial No. labelled on the workstation main unit has been used as hostname and there are doubts if that is the correct hostname (which is the case when the computer has been exchanged), select Software upgrade and Restore hostname.

NOTICE	**Restore hostname from most recently used backup MO disk.**

5. Select Restore Disk and press Enter to restore data from MO disk (see Page 5 - 21). This copies the database from the MO disk to the hard disk.

⚠CAUTION	**When restoring data, be sure to insert the MO disk that was used most recently before the reinstallation of software.** **Date for last update of MO disk is displayed on the monitor before confirmation of restore.** **If the system is restored from an older MO disk, the most recent folders will be lost from the database and the numbering of the new MO disks can be incorrect. Please contact HSC for more information.**

6. Select Restore and press Enter to copy the data to the hard disk.

NOTICE	**Set-up the printer once again after software reinstallation. Printer information can not be restored.**

7. Control and if necessary activate or deactivate the screen lock function.

Final procedures

1. Check in Database mode that the latest examination performed is available and the images can be viewed.
2. Check camera image quality in normal and high resolution. Use calibration exposure data, see Appendix 2.
3. If the image shows defects e.g. lines, spots or irregularities such as 45 degree-mesh pattern, calibrate the camera according to CCD camera calibration and maintenance on Page 5 - 22.
4. Check biopsy accuracy with the test phantom, if the accuracy is not within $\pm$ 1mm in (x, y, z), calibrate the biopsy unit according to Calibration of the biopsy unit on Page 5 - 3.
5. Turn screen lock on/off, according to Software upgrade, Miscellaneous on Page 5 - 18.

Workstation

The system displays error and warning messages on the screen for abnormal situations:

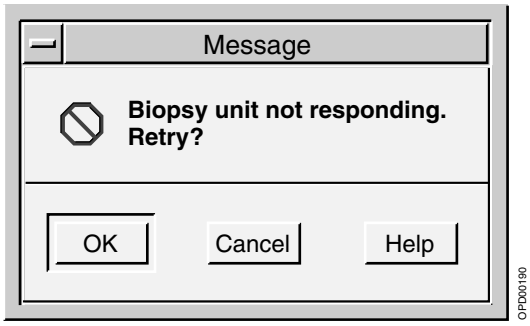


Fig. 1 Error message dialog

The table below shows some of the messages that can occur on the workstation screen. For other messages, see Messages in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

Message	Possible cause and action to take
An error occurred while calibrating. Please press EXIT and try again!	Failure during stereo calibration. Press Exit and try again.
Backup could not be performed. Press OK to continue	Failure during the backup procedure. Press OK. It could be problems with cabling, SCSI termination or dust in the MO unit. Check power and cabling and retry.
Biopsy unit not responding. Retry?	No contact with biopsy unit. Retry.
Camera exposure timeout.	The time between pressing Acquire from the workstation and releasing the exposure from the MAMMOMAT generator has exceeded 60 seconds.
Camera not responding. Retry?	No contact with camera. Retry.
Cannot use biopsy unit.	Communication error or hardware failure in biopsy unit. Check power and cabling and retry.
Cannot use camera.	Communication error or hardware failure in CCD camera. Check power and cabling and retry.
Cannot use mammomat.	Hardware failure in MAMMOMAT. Check power and cabling and retry.
Double exposure with improper stereo angles!	A double exposure has, possibly by mistake, been exposed with the same stereo angle. If decided, acquire and expose again with the correct stereo angles.
Error transmitting targets to the biopsy unit.	The system has detected an error while transmitting target to the biopsy unit. Check connections. Try again.

Message	Possible cause and action to take
Exposure aborted.	The exposure failed due to MAMMOMAT or AEC error.
Exposure values out of range.	The values given by the MAMMOMAT are out of range. Possible failure in MAMMOMAT or installation.
Failed to calibrate biopsy unit.	Failure during calibration. Press Exit and try again.
Failed to copy folder(s)	The target disk may be full or corrupt.
Failed to initialize for Network Setup	Failure during Network Setup. Press OK. Check power and cabling and retry.
Failed to initiate biopsy unit.	Communication error at start-up. Check connections to the biopsy controller and retry.
Failed to store on MO disk	Check cabling, MO unit and MO disk. MO disk may be full.
Failed to transmit target.	The system has detected an error while transmitting target. Check connections to the biopsy controller and retry.
Find and adjust the reference marks, then press OK!	Exposure has been performed, the reference marks cannot be found. Adjust contrast and brightness to visualize them. Click with the pointer on the reference T and press OK.
Internal error.	A software failure has occurred. Restart the system.
Internal error. Retry?	A software failure has occurred. Retry.
Mammomat not responding. Retry?	No contact during start-up. Retry.
Storage MO disk not available.	Check cabling, MO unit and MO disk. Check if MO disk is inserted.
System Error	A system failure has occurred. Restart the system.
Warning: Camera installation not complete.	Incorrect camera calibration. Perform camera calibration and maintenance, see Page 5 - 22.
XX images expected, YY found.	The system has detected a failure in the database. If backup exists, restore backup data, see Restoring backup data in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®

Control panel

The MAMMOMAT generator control panel gives the user additional information at abnormal situations.

Error message	Possible cause and action to take
Error message 777: “Exposure sequence is aborted by Opdima®”.	- The time between pressing Acquire from the workstation and releasing the exposure from the MAMMOMAT generator has exceeded 60 seconds. Press the Limit button on MAMMOMAT generator control panel to continue. - The exposure parameters (kV, mAs) chosen will give a too weak beam quality for the object. Press the Limit button on MAMMOMAT generator control panel to continue. - The exposure parameters (kV, mAs) chosen will give a too hard beam quality for the object. E.g. if AEC mode is used and the estimated mAs is lower than 5 mAs. May happen when using the stereo calibration phantom. Press the Limit button on MAMMOMAT generator control panel to continue and choose lowest kV in AEC mode or set manual exposure parameters. - The Cancel button has been pressed while “Expose at MAMMOMAT” or “Exposure preparation started” were displayed. Press the Limit button on MAMMOMAT generator control panel to continue.
Error message 778: “No communication present between MAMMOMAT and Opdima®”.	Press Retry from workstation or press the Limit button on MAMMOMAT generator control panel to continue. **See also warning below.**
Error message 779: “The mAs value for the main exposure in Opdima® AEC has not been received in time”.	Communication problem. Press the Limit button on MAMMOMAT generator control panel to continue.
External diaphragm lamp is lit on the generator control panel.	Opdima® external diaphragm not mounted. Mount Opdima® external diaphragm.

⚠WARNING **When resetting error 778 with the limit button on the MAMMOMAT, the MAMMOMAT will switch to film exposure mode (“OP” disappears from the display on the generator). To resume Opdima® mode; in the control dialog of the Opdima® system, select Exit and choose the required mode (Stereo or Spot) in the Mode selection dialog.**

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Fault isolation chart

NOTICE **This chart is to be regarded as a guide only, and not as a complete service tool.**

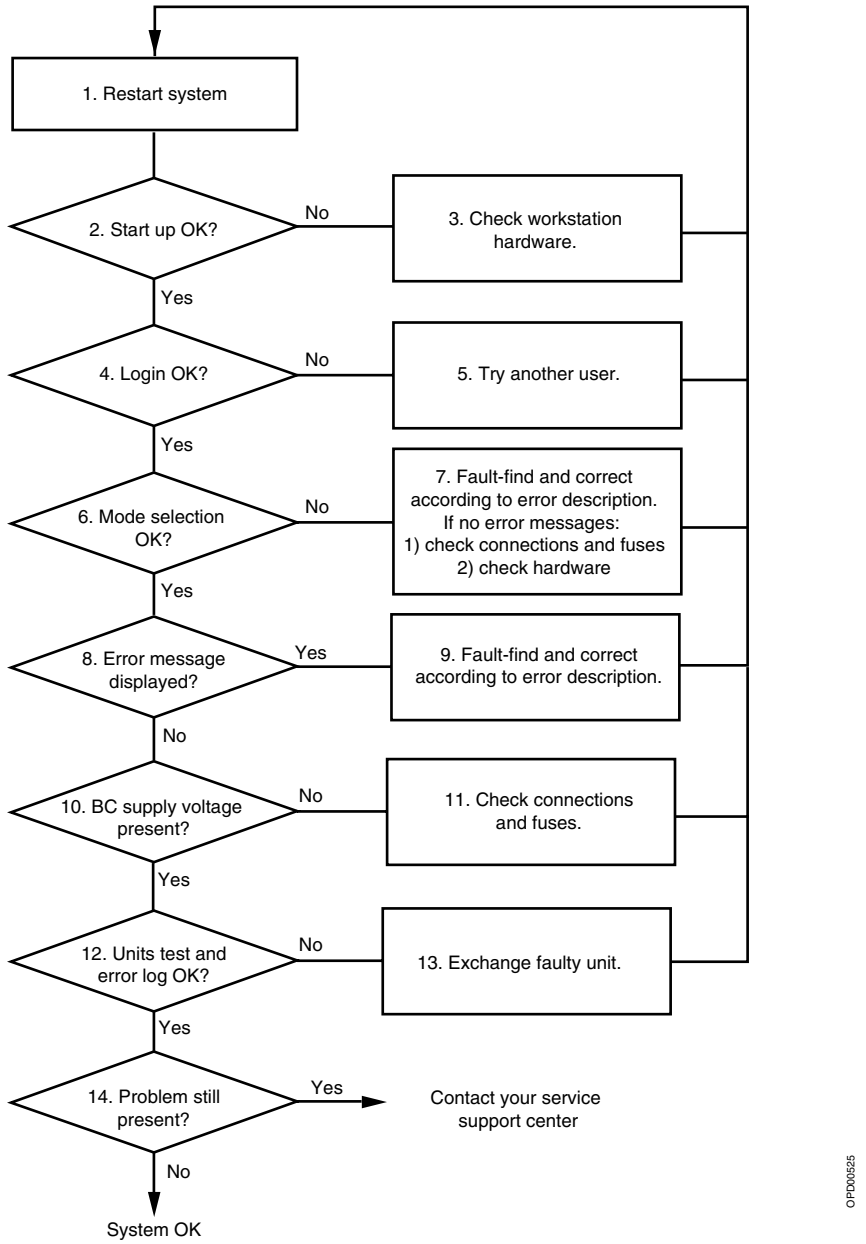

Fig. 1 Fault isolation chart

Explanations

Step	Explanation
1	Restart the system.
2	The workstation hardware is tested automatically when booting the workstation, (the Opdima® hardware is not tested). If an error is detected, the type of error is displayed on the screen.
3	Check the connectors of the hardware units. Exchange faulty units.
4	Log in as service.
5	The user name and password used could have been invalid.
6	Depending on selected mode, tests are performed automatically.
7	Take measures according to the displayed error message. If no error messages: check connections and fuses, check hardware.
8	Error messages are displayed on the workstation screen if the system detects an error.
9	Take measures according to the displayed error message.
10	Check LEDs indicating voltage present in the biopsy controller.
11	Check connections and fuses in the biopsy controller.
12	Perform units test from the workstation service mode. Check the log for abnormal occurrences.
13	Change faulty unit according to instructions.
14	If the problem is still present, contact your service support center.

General

In general, always check the log files for more information,
see Log inspection on Page 5 - 29.

NOTICE

The MO disks used in the Opdima® system are equipped with a mechanical write protection lock. This lock shall never be used since the Opdima® system always attempts to mount the MO disk as a read/write device.

If the write protection lock is activated, the behavior is undefined. There may be a lot of error messages written across the screen, hiding the Opdima® dialogs (windows), internal error may occur and/or the system may reboot spontaneously.

If error messages occur on top of the normal Opdima® screen, wait until no more error messages are written and the activity lamp on the MO unit is turned off. This may take a while (30 minutes) depending on the operation that initiated the error messages. Then eject the MO disk if possible, otherwise see below.

All effort shall be taken to try to find the control dialog (window) and Exit the normal way. The dialogs may be hidden by error messages, but can be found by pointing and clicking on screen. Log out and log in as “poweroff” to shut down the system. If necessary, power off the MO unit and turn it back on to be able to eject the disk. Then turn on the workstation again.

Biopsy unit

Biopsy unit not responding

- Check power switch on biopsy controller.
- No contact during start-up. Retry.
- Check cables.
- Check biopsy controller, fuses and power.
- Check LEDs V1-V5 on the D200 board

  - V1, TxD error -> Replace the D200 board according to Replacement of components in the biopsy controller on Page 6 - 5.

  - V2, NVM error -> Initialize the BC nvram according to Initialization of BC nvram on the D200 board on Page 9 - 2.

  - V3, ADC error -> Replace the D200 board according to Replacement of components in the biopsy controller on Page 6 - 5.

  - V4, PROM error -> Replace the EPROM according to Replacement of components in the biopsy controller on Page 6 - 5.

  - V5, RAM error -> Replace the D200 board according to Replacement of components in the biopsy controller on Page 6 - 5.
- If LED V2 (NVM error) and error message “Biopsy unit not responding” appear after replacement of D200, follow the procedure described in Initialization of BC nvram on the D200 board on Page 9 - 2.
- Recalibrate biopsy unit.
- If “Biopsy unit not responding” occurs after calibration, proceed with retry.

Problem with calibration

- Check that you have all targets in the image, use 0.7 magnification.
- Check that you use the right needle length.
- Check that you have set the same target both on the biopsy unit and in the workstation.

Initialization of BC nvram on the D200 board

Background: In ASW a unit test of the Mammomat, Biopsy Controller and Camera is performed when entering Stereo Calibration. (Stereo calibration is blocked if any of the unit tests fails.) However, if the D200 board in the BC is replaced with a new board, this new board will have an empty nvram, i.e. no checksum will be present in the nvram. This will be reported as an error by the unit test, and stereo calibration (which updates the checksum) will be blocked.

Proceed as below to perform a ”dummy calibration”, that will update the checksum.

NOTICE	**The system MUST NOT be used with this ”dummy calibration”! Calibrate with ”Biopsy Calibration” directly when the system is up.**

1. Adjust the needle to ”Target 1” position (upper-right-back position) according to Calibration of the biopsy unit on Page 5 - 3. Use a 90 mm. needle, or place the needle guide approx 90 mm above the target.
2. Log in as service
3. Open a terminal window:
   Press Ctrl + Alt + ! simultaneously.
   Confirm switching to default behavior (the screen flashes for a second as the window manager is restarted).
   Place the mouse pointer at the desktop, and press the right mouse button.
   Choose ”New Window” in the pop-up menu.
   Click in the terminal window to select it for writing into.
4. Start the ”BC communication program” with:
   `/opt/dsbas/bin/dlsh  /dev/ttyb 2>/dev/null` <Enter>

   (The cursor will move to an new empty line, where you can execute commands to the BC, and read the response to the command)
5. Send Target 1 to the BC by typing:
   `CALIB 15.0 40.0 165.0` <Enter>

   (The response to the ”`CALIB x x x`” command shall be ”`CALIB ready`”. If ”`CALIB error`” is received the calibration process can be aborted with the command ”`CALIB abort`”. If so, start the procedure over again from step 1.)
6. Move the needle to ”Target 2” (down-left-front position).
7. Send Target 2 to the BC by typing:
   `CALIB -25.0 10.0 95.0` <Enter>
8. Update the nvram by typing:
   `CALIB execute` <Enter>

   (The response to the ”`CALIB x x x`” command shall be ”`CALIB ready`”. If ”`CALIB error`” is received the calibration process can be aborted with the command ”`CALIB abort`”. If so, start the procedure over again from step 1.)
9. Perform the unit test by typing:
   `TEST board` <Enter>

   (The response should be SELFTEST ok, or an error code: 1=ram-error, 2=prom-error, 3=adc-error, 4=nv-sum-error)
10. Close the ”BC communication program” with Ctrl + d.
11. Close the terminal window by typing: exit <Enter>
12. Press Ctrl + Alt + ! simultaneously. Confirm by pressing ok. It will now switch to custom behavior (the screen flashes for a second as the window manager is restarted).
13. Perform a Calibration of the biopsy unit on Page 5 - 3.

Camera

Camera not responding

- No contact during start-up. Retry.
- Check that MAMMOMAT and Biopsy controller are powered on.
- Power off and reboot Opdima® workstation.
- View error log, if message cannot reach CCD camera on/dev/CCD0 appears, check that D101 is properly connected inside the workstation.
- Check cables.
- Check biopsy controller, fuses and power.
- Change D100/D101.
- Change D200.

Cannot use camera

- Hardware failure in CCD camera. Retry.
- Check that MAMMOMAT and Biopsy controller are powered on.
- Power off and reboot Opdima® workstation.
- Check cables.
- Check that board D100/D101 is properly connected.
- Change D100/D101.
- Change camera.

Workstation

If “Bogus file system” appears

- Check cables, see SCSI cables, CD-ROM and Cables general in MAMMOMAT 1000/ 3000/3000 Nova - Opdima® Maintenance Instructions.
- Try to reboot.
- Reload the software, see Page 6 - 11.

Problem with date in database mode

- Check the Country Settings Date Pattern: e.g. m/d/y. This defines only the order that the date will be in. Do not type mm/dd/yy.

Opdima user interface does not appear at log in

Symptom:

After logging in to Opdima, the Mode selection windows does not appear. Instead there are a few other windows and a message box containing the text:

“The Open Windows environment may no longer be supported in a future release. You may want to migrate to CDE, the Common Desktop Environment.
Check here to disable this message.
Continue”

Solution:

1. In the window titled “cmdtool (CONSOLE) - /usr/bin/ksh”, write:
   `rm .dt/sessions/lastsession`
   and then press the ENTER key. There should be no response to this command. If there is an error message, e.g. .dt/sesions/lastsession: No such file or directory, then the command was typed incorrectly; just try again.
2. Right-click the blue background, choose “Exit...”
3. In the message box “Please confirm exit from window system”, choose “Exit”.
4. Log in again using the same username as previously.
5. In the message box “Welcome to Solaris. /.../ Choose one: Common Desktop Environment (CDE) OpenWindows Desktop”, make sure “Common Desktop Environment (CDE)” is checked and then click OK.

No images displayed on monitor

- If no image on the monitor, check that input select is set to 1.

NOTICE	**If removing the cover of the workstation main unit, check that no copper grounding clip comes loose.**

Problems with the centering or size of the displayed image on the monitor

If the image is displayed with the wrong size or is not displayed in the centre of the monitor adjust the settings according to the chapter “Installation of monitor” in the Installation and Start-Up Instructions.

Problems with the DICOM license

1. Be sure that the Network settings is OK otherwise the DICOM license could not be activated.
2. Check again that the host id is right.
3. Enter advanced service/country settings.
4. Change language to another language than english.
5. Enter Apply and after that Close.
6. Enter advanced service/country settings again and change back to english.
7. Enter Apply and after that Close.
8. Enter the license key and activate with Apply.
9. Follow the Instructions on the screen.
10. Change back to the original language, if the customer was running another language than english.

Tests

- Power on failure. Sun Blade 150 Service Manual, chapter 4.
- Video output failure. Sun Blade 150 Service Manual, chapter 4.
- Hard drive, CD-ROM, or DVD-ROM drive failure. Sun Blade 150 Service Manual, chapter 4.
  Comment: When replacing the hard drive, reload the complete software.
- Power supply test. Sun Blade 150 Service Manual, chapter 4.

For more information in general about Sun Blade 150 see Sun Blade 150 Hardware Documentation (included in the Opdima® delivery)
Files included on the CD-ROM;
Sun Blade 150 Getting Started Guide,
Sun Blade 150 Service Manual with Sun Blade 150 ShowMe How Animations and Setting Up the Sun Blade 150 System

Image Quality

Problems during calibration

- Check that grid lines are not visible in images taken with a table without grid e.g. biopsy unit. If visible, see CCD camera calibration and maintenance on Page 5 - 22.
- Calibration not completed takes unexpectedly long time. This can be a defective camera or a mechanical alignment problem. Try to calibrate without external collimator, activate switch or use a collimator with larger hole e.g. Axilla collimator.

NOTICE	**Always use Opdima® collimator in normal use.**

Quadrant difference on patient images

When doing images on calibration plexiglas (also called: homogeneous acrylic plastic = PMMA = Poly-methyl-met-acrylate) plates there can be a slight difference between the quadrants, which will not be visible in patient images. Make sure that quadrant difference exists in patient images before changing the CCD camera.

- Calibrate the CCD camera.
- If it is not disappearing, please contact the headquarter support center, HSC 24/USC, for investigation.

Quadrant missing

- Try to calibrate the CCD camera.
- Please contact the headquarter support center, HSC 24/USC, for investigation.

White line/dot

- Calibrate the CCD camera, move acrylic plastic plates after each calibration exposure.
- If it is not disappearing, please contact the headquarter support center, HSC 24/USC, for investigation.

MAMMOMAT

Cannot use MAMMOMAT

- Try again.
- Switch off/on the MAMMOMAT.
- Power off and reboot the Opdima® workstation.
- Check biopsy controller, fuses, and power.
- Check cables.
- Check D707, must be installed.

Network problem

DICOM (option), checklist:

- A RJ-45 network connector is needed.
- If the distance between the Opdima® workstation and the network connector is longer than 3,5 m (3,5 m cable included in the package) a UTP-5 cable of maximum 50 m is needed.
- The license key to enable the DICOM (option) is written on the invoice and the dispatch note (if not, please contact Siemens-Elema AB mammography department in Solna, Sweden for further information).
- To be able to receive the optional DICOM license key the mammography logistics department will request for the serial No. and the host ID for the workstation in question. How to receive these parameters is described in Instruction for obtaining the systems host ID and hostname on Page 5 - 15.
- The Opdima® system needs the following information to be connected to the network:
  IP address: (e.g. 123.123.123.11)
  Netmask: (e.g. 255.255.255.0)
  Default router: (e.g. 123.123.123.22)

NOTICE	**The IP address and the default router may not contain any initial 0, e.g. 10.10.10.10 is OK but 010.010.010.01 is not OK.**

For further information see DICOM Conformance Statement for Opdima® ASW 2.0 which is available on Intranet.

- Network information about the DICOM nodes, which will be connected to the Opdima® system.
  The following information for all DICOM nodes is necessary:
  Hostname: (e.g. opdxxxx)
  IP address: (e.g. 123.123.123.11)
  DICOM Port: (e.g. 1984 for Opdima)
  DICOM AET: (e.g. opdxxxx_SRV)

NOTICE	**For Opdima®, hostname, DICOM Port and DICOM AET are fixed.**

xxxx is the serial No. for the workstation. The serial No. is labelled on the cover of the main unit (last four digits). The last four digits of the hostname normally consists of the last four digits of the serial No. This will not be the case if there has been a hostname change due to a workstation exchange.

General Information about networking

- Project Manager Handbook: CS home page, http://cs.med.siemens.de
  For Service
  Planning
  Project Manager Handbook

Printer

Printer connected directly to Opdima

Print problem:

- Check the crossover network cable.
- Check IP address

Printer connected to network

Print problem:

- Check cables, normal network cable.
- IP address from network administrator at the hospital.
- When defining the printer in advanced service use PS for all postscript printers and XWD for Codonics printer.

MO unit

- Check that correct media is used, see spare part list.
- Check that write protection is not activated.

All problems with MO disk

- Identify MO disk, see Page 5 - 19.
  If more than one disk type or disk number is reported please contact the headquarter support center, HSC 24/USC, for investigation.
- Check and, if necessary, repair MO disk, see Page 5 - 19.
- Make sure that the SCSI cables are properly connected and fixed to the units and that the cable is not bent to much just behind the MO unit, see Page 6 - 2.
- Check that the MO unit is terminated correctly.

If the message “Failed to store on MO disk” appears

- Make sure that local storage disk is inserted.
- Make sure that MO unit is switched on.
- Identify MO disk, see Page 5 - 19.
- Check if MO disk is full.
- Check and, if necessary, repair MO disk, see Page 5 - 19.
- Try to save on a new MO disk.
- Power off and reboot the Opdima® workstation.
- Check cables, termination. Change MO unit.

If the message “Cannot read disk Prepare disk?” appears

⚠WARNING **Prepare disk can not be performed on a new 2.3 GB MO-disk if using a 9.1 MO unit.**

- If it is a new disk, press OK (this will format the disk). Else, press Cancel.
- Identify MO disk, see Page 5 - 19.
- Check and, if necessary, repair MO disk, see Page 5 - 19.
- Power off and reboot the Opdima® workstation.
- Check cables and termination, see MAMMOMAT 1000/3000/3000 Nova - Opdima® Maintenance Instructions.
- Change MO unit.

Cannot communicate with MO unit

Test of SCSI bus

⚠WARNING **Test of SCSI bus can destroy the hard disk content. The software may have to be reinstalled.**

- Press the buttons Stop and A simultaneously as soon as possible when the system is booting up, you will then get the OK prompt.

⚠WARNING	**If Stop A is not pressed directly when the system starts to boot, the probe-scsi-all command will hang the system without showing any SCSI-devices. Power supply switch must be used to turn off the system.**

- Type "`probe-scsi-all`", the system should show all the drives connected to the bus.

  MO unit Target 1
  (The hard disk and CD drive are
  connected to an internal ide bus)

  Example of a printout when the MO is connected and accessable.

  Target 1
  Unit 0 Removable Disk SONY SMO-F561 1.07

  If the printout above is not presented the MO cannot be accessed.

  Check the following:

  1. Check that the power is turned on

  2. Check that the SCSI cable is connected

  3. Check that the SCSI terminator plug is attached

  4. Check that the switch settings on the back of the MO is right configured. (see Fig. 3, Page 6 - 3)

  5. Replace the SCSI-cable, MO unit and SCSI-board and enter the probe-scsi-all command between each replacements to isolate the fault to a specific unit.

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Verifying the calibration of the biopsy unit

Perform stereo examination with stereo calibration phantom.

1. Prepare the system according to Setting up the system for stereo examination in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.
2. Perform step 1. to 25. of a stereo examination on the stereo calibration phantom (Fig. 4, Page 5 - 4), see Performing stereo examination in Supplement to the Instructions for Use MAMMOMAT 3000 - Opdima®.

   Use a fictive patient ID. Record the patient ID in Appendix 2.
3. Adjust the adjustment knobs on the biopsy unit so that the needle will not hit the stereo calibration phantom. Insert fine needle.
4. Use the adjustment knobs on the biopsy unit to adjust the needle to the stereo calibration phantom target. The needle shall be positioned according to Fig. 5, Page 5 - 4.
5. Check that the biopsy unit displays do not show values more than ±1 mm. If they do, perform a biopsy calibration. After calibration of the biopsy unit, perform step 1. to 5. again. Fill in your values in the test protocol for repetitiveness (see Appendix 2).

Check of Opdima AEC

The objective is to assess the performance of the AEC (automatic exposure control) function with different exposure conditions.

In this test, images shall be obtained using different combinations of kVp, anode/filter material and object thickness. The AEC is designed to control the exposure so that the mean AD value of the images obtained of homogeneous phantoms shall be close to 800 independently of these parameters. For some combinations of kVp, object thickness and anode/filter material, the minimum mAs value (12 mAs) or maximum mAs value (560 mAs, or lower due to MAMMOMAT limits) is the limiting factor for proper AEC functionality. These combinations are of no clinical relevance and should not be tested, and have been marked with a gray color in the test report tables (Appendix 2).

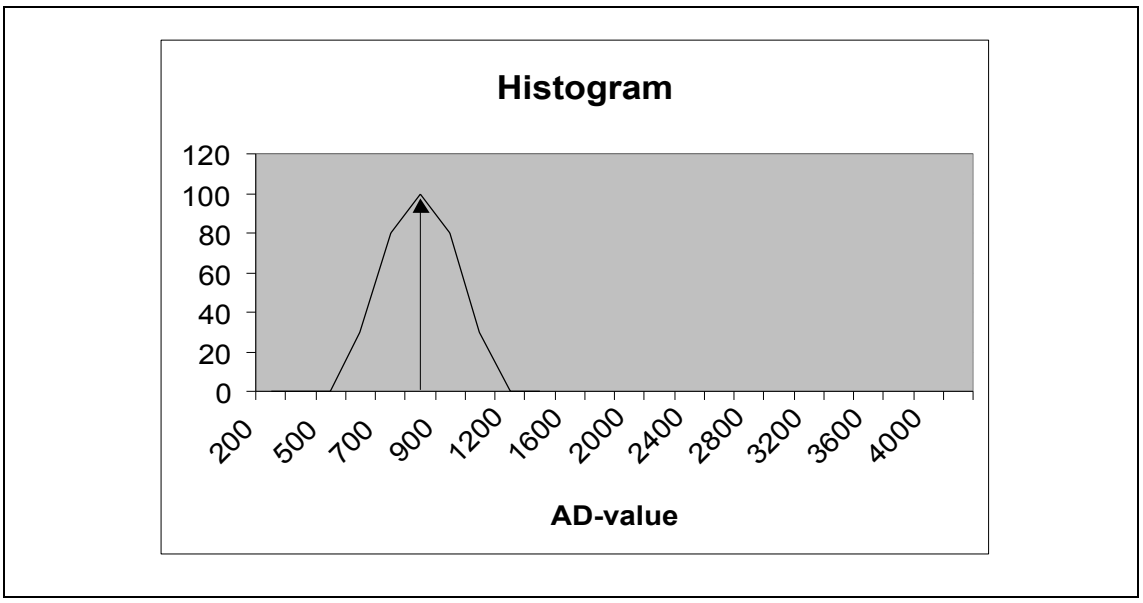

Fig. 1 Histogram

Procedure

1. Start a new examination.
2. Enter Spot mode.
3. Use the table that will be used by the customer, images shall be taken at normal resolution, and the mammography unit shall be used with a grid object table.
4. Initially, place one plate of calibration plexiglas 19 mm on the object table.
5. The first image shall be obtained using 26 kV and Mo/Mo as exposure parameters.
6. Examine the image and measure the mean value. The gray scale parameters (center and width) are shown in the upper bar of the Opdima® window. The center value is approximately the mean value and shall be used as such in this test. Note that these values (gray scale center and width) are automatically set to optimal when an image is captured, but will be affected by adjustments made to brightness or contrast in Opdima®. Because of this, no adjustments shall be done to these parameters before reading the AD center value, in order to get a correct reading.

7. Fill in the mean (center) value in the appropriate space in the test report tables (Appendix 2).
8. Repeat step 4. to 7. with all combinations of object thickness, kV parameter and anode/filter combination that are found in the test report tables in the Appendix 2.

Performance Criteria

The measured mean value shall be equal to 800±15% (above 680 and below 920) for all examined combinations of object table, anode/filter material, kV value and object thickness.

NOTICE

If the exposure times are long it can be possible to distinguish that the image is divided into a pattern of "blocks" see Fig. 2. The system is calibrated for clinical exposure times which shall be kept short in order to avoid movement blurredness of the image and also to avoid high dose exposure of the patient.

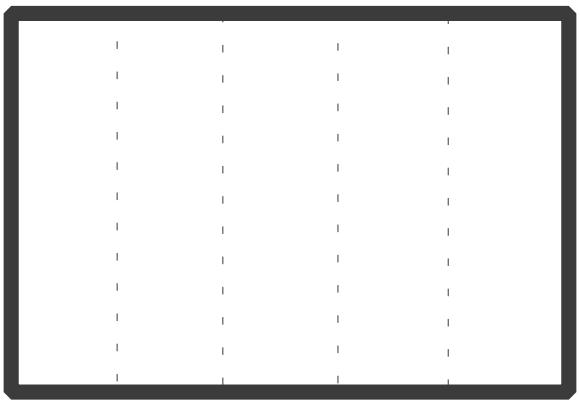

Fig. 2 Pattern of "blocks"

Check of resolution

The objective is to ensure that a sufficient spatial resolution is obtained with the Opdima® system.

Procedure

1. The grid object table shall be used.
2. Select Mo/Mo.
3. To get a proper mAs-value, perform a test exposure in AEC-mode with ~ 40 mm calibration plexiglas without the bar pattern (it might interfere with the sensitive area of the AEC). Use a kVp that is commonly used clinically and record this value.
4. Manually select (on the control panel of the MAMMOMAT) the mAs-value that is closest to the measured AEC mAs value and use it during the following measurements (with AEC mode disabled).
5. Position the “Bar-pattern” on the ~ 40 mm calibration plexiglas, 1 cm from the chest wall edge. Position the bar pattern diagonally, i.e. with the bars at an angle approximately 45 degrees to the anode-cathode axis.[1] Make an exposure at normal resolution.
6. Use the magnification tool and change grayscale settings to optimize viewing conditions for this evaluation. The grayscale settings are changed using the “brightness” and “contrast” controls in Opdima®, either using the scroll bars at the right side of the screen, or by clicking with the middle button of the mouse and dragging. Adjust these setting in order to get the best possible image of the bar pattern. For example, if using 27 kVp and Normal resolution, a gray scale center of 380 and of width 110 might be useful. Note that these values are only guidelines - depending on the specific systems, other values might be more appropriate.
7. Examine the image and determine the highest line-pair resolution where dark/light lines can still be differentiated, and note this value in the test report tables (Appendix 2).
8. Repeat steps 3. to 7. with a W/Rh[2] target/filter combination, if used clinically.
9. Repeat steps 2. to 6., but make the exposure at high resolution this time.

Performance Criteria

The measured resolution shall be at least 10 lp/mm in normal mode, and at least 13 lp/mm in high-resolution mode[3].

1.This test is designed to ensure the performance of the Opdima system and not the MAMMOMAT, which should be tested separately. Therefore, the test is performed with the bar-pattern positioned at a single angle. A test of the bar-pattern positioned diagonally is sufficient to ensure quality of the Opdima components, and differences in resolution at different angles (parallel vs. perpendicular to anode-cathode axis) is due to MAMMOMAT limitations, and shall therefore be tested and verified in the QC of the MAMMOMAT. Interference between the bar-pattern and the detector grids might affect measurements if they are performed with parallel or perpendicular orientation.

2.It is not necessary to perform the test with a M/Rh-combination since different filters do not have an impact on resolution.

3.The maximum theoretical resolution for the detector in Normal Resolution mode is 12.4 lp/mm, and the detector (part of Opdima) will be the limiting factor. For High Resolution mode the maximum theoretical resolution is > 20 lp/mm, and the x-ray tube (part of the MAMMOMAT) will be the limiting factor.

Protective earth measurement

Protective earth measurement shall be performed after completed hardware service. Record type, serial number and calibration date of the instruments together with measured values in the service report.

Biopsy unit

Use the protective ground wire tester (≤ 6V/10−25A).

1. Measure the resistance between the ground connection of the stand and the measuring points on the biopsy unit according to Fig. 3. Use a sharp-pointed tool to penetrate the finishing paint. Fill in your values in the test protocol for protective earth measurement (see Appendix 2).

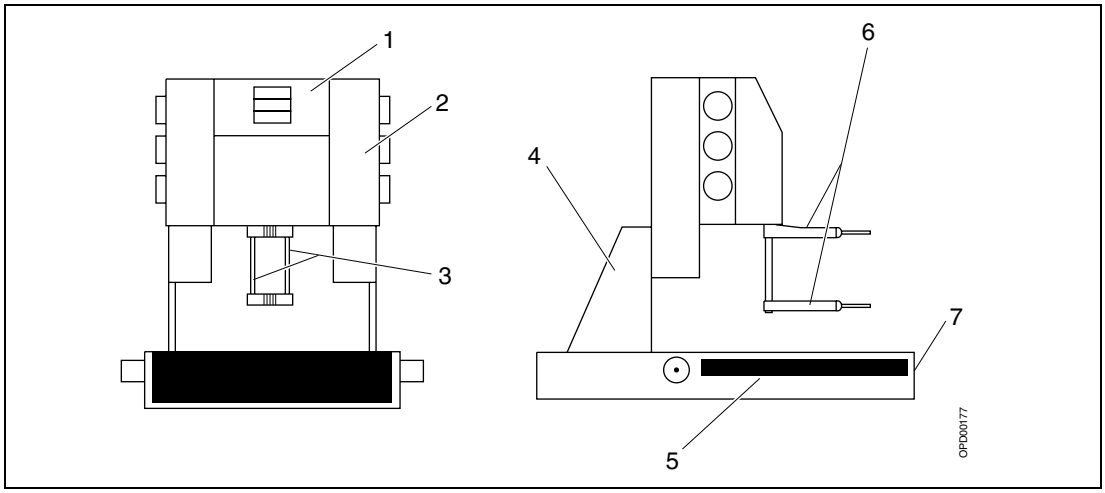

Fig. 3 Measuring points on the biopsy unit

The value of the resistance measured must not exceed 0.1 Ω, except for measuring points 3 and 6 for which no limit is required (the test performed complies with IEC 601-1 subclause 18A).

Biopsy controller

Use the protective ground wire tester (≤ 6V/10−25A).

1. Measure the resistance between the ground connection of the stand and the cover of the biopsy controller. Use a sharp-pointed tool to penetrate the finishing paint. Fill in your values in the test protocol for protective earth measurement (see Appendix 2).

The value of the resistance measured must not exceed 0.1 Ω.

CCD camera

Use the protective ground wire tester (≤ 6V/10−25A).

1. Measure the resistance between the ground connection of the stand and measuring points on the CCD camera according to Fig. 4. Use a sharp-pointed tool to penetrate the finishing paint. Fill in your values in the test protocol for protective earth measurement (see Appendix 2).

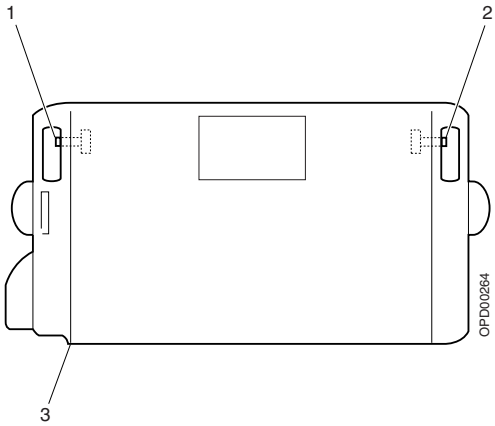

Fig. 4 Measuring points on the biopsy unit

The value of the resistance measured must not exceed 0.1 Ω.

Biopsy controller cable duct

Use the protective ground wire tester (≤ 6V/10−25A).

1. Measure the resistance between the ground connection of the stand and the cover of the biopsy controller cable duct. Use a sharp-pointed tool to penetrate the finishing paint. Fill in your values in the test protocol for protective earth measurement (see Appendix 2).

The value of the resistance measured must not exceed 0.1 Ω.

Chap.	Name of chapter	Changes to previous version
0		Completely revised.
1	General	The document is valid for ASW 3.1.

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Database log file

This is what a log file (see Page 5 - 29) might look like.

```
==========================
Checking patients
==========================
----------------------------
Reading patient id: 00-00001
Last name: Mrs A
First name: A
Date of birth: 400101
Gender: female
Number of examinations: 0
----------------------------
Reading patient id: 00-00002
Last name: Mr B
First name: B
Date of birth: 500101
Gender: male
Number of examinations: 0
----------------------------
Reading patient id: 00-00003
Last name: Mrs C
First name: C
Date of birth: 600101
Gender: female
Number of examinations: 0
----------------------------

==========================
Checking folders
==========================
----------------------------
Reading folder id: 877524428
patient id: 00-00001
Folder name:
Folder type: spot examination
Folder creation time: 877524428
Folder creator: user
Examination type: Spot
Examination subject: Unknown
Number of images: 0
Stereo data: 0
Target side: SIN
----------------------------
Reading folder id: 877526913
patient id: 00-00002
Folder name:
Folder type: spot examination
Folder creation time: 877526913
```

NOTICE! Not used (always 0).

NOTICE! This folder is empty.

```
Folder creator: user
Examination type: Spot
Examination subject: Unknown
Number of images: 1
Stereo data: 0
Target side: SIN
-----------------------------
Reading folder id: 877527322
patient id: 00-00003
Folder name:
Folder type: spot examination
Folder creation time: 877527322
Folder creator: user
Examination type: Spot
Examination subject: Unknown
Number of images: 3
Stereo data: 0
Target side: SIN
-----------------------------
Reading folder id: 877567455
patient id: 00-00003
Folder name:
Folder type: stereo examination
Folder creation time: 877567455
Folder creator: user
Examination type: Core biopsy
Examination subject: Calcifications
Number of images: 3
Stereo data: 0
Target side: SIN
-----------------------------
Reading folder id: 982139514
patient id:
Folder name: Stereo Calibration
Folder type: stereo examination
Folder creation time: 982139514
Folder creator: user
Examination type:Stereo Calibration
Examination subject:
Number of images: 4
Stereo data: 0
Target side: SIN
-----------------------------
=========================
Checking filestore
=========================
-----------------------------
Reading folder id: 877524428
Copied to MO disk #0
Last modified 877524428
-----------------------------
Reading folder id: 877526913
```

NOTICE! Empty patient id, used for biopsy calibration.

NOTICE! There are no images to save, see Page A2-1.

```
Copied to MO disk #0
Last modified 877526913
-----------------------------
Reading folder id: 877527322
Copied to MO disk #2
Last modified 877527322
-----------------------------
Reading folder id: 877567455
Copied to MO disk #3
Last modified 877567455
-----------------------------
Reading folder id: 982139514
Copied to MO disk #3
Last modified 982140155
-----------------------------
=========================
Checking patientfolder
=========================
-----------------------------
Reading patient id:
Number of folders: 1
Folder id 0:         982139514
-----------------------------
Reading patient id: 00-00001
Number of folders: 1
Folder id 0:         877524428
-----------------------------
Reading patient id: 00-00002
Number of folders: 1
Folder id 0:         877526913
-----------------------------
Reading patient id: 00-00003
Number of folders: 2
Folder id 0:         877527322
Folder id 1:         877567455
-----------------------------
```

NOTICE! Images not saved to local MO disk yet, see Page A2-2.

NOTICE! Empty patient id, used for biopsy calibration.

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Customer specific data

Parameter	Value
Language	
ID Pattern	
Date Pattern	
Service Center	
Fictive patient ID	
Institution Name	
Department Name	

Test protocol repetitiveness

Biopsy calculations

Tester	Object	X	Y	Z	ΔX	ΔY	ΔZ
	1						
	1						
	1						
	1						
	2						
	2						
	2						
	2						
	3						
	3						
	3						
	3						
	4						
	4						
	4						
	4						

Test protocol CCD camera calibration

CSE in charge: _____

Calibration date: _____

Table

Grid ☐ Non grid ☐

For grid table only

Grid fast speed time	_____	(1500 ms)
Grid fast speed	_____	(99% of max)
Grid slow speed	_____	(40% of max)

For grid or non grid table

Calibration plexiglas	_____	(40 mm grid, 30 mm non grid)
kV	_____	(27 kV grid, 26 kV non grid)
Anode/filter material	_____	(Mo/Mo grid, Mo/Mo non grid)
Mode	_____	(AEC mode grid, AEC mode non grid)

Test protocol image quality

AEC function

Grid table

Measured mean value, using ~ 20 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 40 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 60 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				
Mo/Rh				
W/Rh				

Measured mean value, using ~ 80 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Rh				
W/Rh				

Non grid table

Measured mean value, using ~ 20 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 40 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 60 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				
Mo/Rh				
W/Rh				

Measured mean value, using ~ 80 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Rh				
W/Rh				

Resolution

Normal resolution

kVp used during tests [ ] kVp

mAs measured during test exposure with AEC and ~ 40 mm plexi [ ] mAs

mAs used during consecutive tests [ ] mAs

Anode/filter combination: Mo/Mo Resolution: Normal

Best resolution visible [ ] lp/mm

Performance criteria: *>=10 lp/mm*

Anode/filter combination: W/Rh Resolution: Normal

Best resolution visible [ ] lp/mm

Performance criteria: *>=10 lp/mm*

Comments:_____

High resolution (if used clinically)

kVp used during tests [ ] kVp

mAs measured during test exposure with AEC and ~ 40 mm plexi [ ] mAs

mAs used during consecutive tests [ ] mAs

Anode/filter combination: Mo/Mo Resolution: High

Best resolution visible [ ] lp/mm

Performance criteria: *>=13 lp/mm*

Anode/filter combination: W/Rh Resolution: High

Best resolution visible [ ] lp/mm

Performance criteria: *>=13 lp/mm*

Comments:_____

Test protocol protective earth measurement

Instrument type: _____

Serial No.: _____

Calibration date: _____

Biopsy unit

Measuring point	Measured resistance (Ω)	Resistance limit (Ω)
1		0.1
2		0.1
3		no limit
4		0.1
5		0.1
6		no limit
7		0.1

Biopsy controller

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1

CCD camera

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1

Biopsy controller cable duct

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1

Customer specific data

Parameter	Value
Language	
ID Pattern	
Date Pattern	
Service Center	
Fictive patient ID	
Institution Name	
Department Name	

Test protocol repetitiveness

Biopsy calculations

Tester	Object	X	Y	Z	ΔX	ΔY	ΔZ
	1						
	1						
	1						
	1						
	2						
	2						
	2						
	2						
	3						
	3						
	3						
	3						
	4						
	4						
	4						
	4						

Test protocol CCD camera calibration

CSE in charge: _____

Calibration date: _____

Table

Grid ☐ Non grid ☐

For grid table only

Grid fast speed time	_____	(1500 ms)
Grid fast speed	_____	(99% of max)
Grid slow speed	_____	(40% of max)

For grid or non grid table

PMMA	_____	(40 mm grid, 30 mm non grid)
kV	_____	(27 kV grid, 26 kV non grid)
Anode/filter material	_____	(Mo/Mo grid, Mo/Mo non grid)
Mode	_____	(AEC mode grid, AEC mode non grid)

Test protocol image quality

AEC function

Grid table

Measured mean value, using ~ 20 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 40 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 60 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				
Mo/Rh				
W/Rh				

Measured mean value, using ~ 80 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Rh				
W/Rh				

Non grid table

Measured mean value, using ~ 20 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 40 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				

Measured mean value, using ~ 60 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Mo				
Mo/Rh				
W/Rh				

Measured mean value, using ~ 80 mm calibration plexiglas

Anode/Filter	26 kV	28 kV	30 kV	32 kV
Mo/Rh				
W/Rh				

Resolution

Normal resolution

kVp used during tests [ ] kVp

mAs measured during test exposure with AEC and ~40 mm plexi [ ] mAs

mAs used during consecutive tests [ ] mAs

Anode/filter combination: Mo/Mo Resolution: Normal

Best resolution visible [ ] lp/mm

Performance criteria: *>=10 lp/mm*

Anode/filter combination: W/Rh Resolution: Normal

Best resolution visible [ ] lp/mm

Performance criteria: *>=10 lp/mm*

Comments:_____

High resolution (if used clinically)

kVp used during tests [ ] kVp

mAs measured during test exposure with AEC and ~40 mm plexi [ ] mAs

mAs used during consecutive tests [ ] mAs

Anode/filter combination: Mo/Mo Resolution: High

Best resolution visible [ ] lp/mm

Performance criteria: *>=13 lp/mm*

Anode/filter combination: W/Rh Resolution: High

Best resolution visible [ ] lp/mm

Performance criteria: *>=13 lp/mm*

Comments:_____

Test protocol protective earth measurement

Instrument type: _____

Serial No.: _____

Calibration date: _____

Biopsy unit

Measuring point	Measured resistance (Ω)	Resistance limit (Ω)
1		0.1
2		0.1
3		no limit
4		0.1
5		0.1
6		no limit
7		0.1

Biopsy controller

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1

CCD camera

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1

Biopsy controller cable duct

Measuring point	Max. measured resistance (Ω)	Resistance limit (Ω)
All		0.1